



DEVI AHILYA VISHWAVIDYALAYA, INDORE

Institute of Engineering and Technology

1.1.2

Minutes of the Meetings and Changes in Syllabus



Devi Ahilya Vishwavidyalaya, Indore

Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 2/09/2015

The following points were discussed in the meeting.

1. Complete Scheme of all ME programs as per the list given below and syllabus of Ist ^{year 5th} ~~sem.~~ of all Full time and Part time ME programs has been approved, by the committee as per the new CBCS pattern in accordance with new ordinance no. 31. (As per the enclosed schemes)
 - ME Computer Engineering with specialization in *Software Engineering*
 - ME Information Technology with specialization in *Information Security*
 - ME Electronics Engineering with specialization in *Digital Instrumentation*
 - ME Electronics Engineering with specialization in *Digital Communication*
 - ME Industrial Engineering & Management
 - ME Mechanical Engg. with specialization in *Thermal & Design Engineering*
2. Scheme and syllabus of I year of all BE programs have been approved, by the committee as per the new CBCS pattern in accordance with new ordinance no. 31. (As per the enclosed schemes)
 - BE Mechanical Engineering
 - BE Computer Engineering
 - BE Electronics & Instrumentation Engineering
 - BE Information Technology
 - BE Electronics & Telecommunication Engineering
 - BE Civil Engineering
3. Scheme and syllabus of I year of BE (PTDC) Mechanical Engineering have been approved, by the committee as per the new CBCS pattern in accordance with new ordinance no. 31. (As per the enclosed schemes)
4. Complete Scheme of MSc Applied Mathematics program and syllabus of I ^{year 5th} ~~sem.~~ has been approved, by the committee as per the new CBCS pattern in accordance with new ordinance no. 31. (As per the enclosed schemes)
5. Committee has decided to postpone the class tests of I year BE, ME and MSc to new dates, i.e. 21-23 Sept. 2015.

Pransav
S.V. Tolcelan
2-9-15
Prudhi
D. Suman
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6. Committee has decided to conduct student's activities under IET club, which will have three wings and will work in the guidance of faculty teams to formulate the norms and activity calendar.

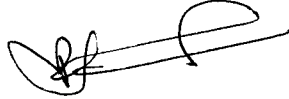
Dr. Ajay Verma shall be the patron IET club. Faculty team is as follows;

- A) IET Sports Club: 1) Dr. Devendra Verma (FA) 2) Dr. Dheeraj Nitnaware
3) Mr. Vijay Karma 4) Mr. Lalit Gehlod
- B) IET Cultural Club: 1) Dr. Pratosh Bansal (FA) 2) Dr. Govind Maheshwari
3) Dr. Sufia Aziz 4) Dr. Uma Bhatt
- C) IET Academic Club: 1) Dr. Ravi Sindal (FA) 2) Dr. Vaibhav Neema
3) Dr. Vaibhav Jain 4) Mr. Amit Gupta

Faculty team is also advised to finalize names of these wings and get approved by the committee.



Dr. Paresh Atri



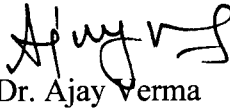
Dr. Ravi Sindal



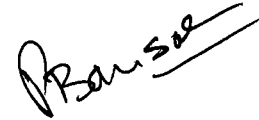
Dr. G. Maheshwari



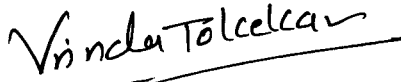
Dr. Meena Sharma



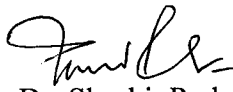
Dr. Ajay Verma



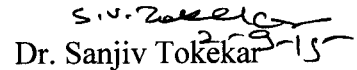
Dr. Pratosh Bansal



Dr. Vrinda Tokekar



Dr. Shashi Prakash



S.V. Tokekar
2-9-15

Dr. Sanjiv Tokekar



Dr. Ashesh Tiwari

**M. E. Computer Engineering (FULL TIME) With Specialization in
Software Engineering
Curriculum & Syllabus
Batch 2015– 2016 and Onwards**

S. No.	Category	No. of Credits			
		SEM I	SEM II	SEM III	SEM IV
1.	Course Compulsory	15	15	-	-
2.	Generic Elective	4	4	-	-
3.	Programme Elective	5	5	-	-
4.	Skill development	2	2	-	-
5.	Seminar/ Workshop/ Research Tool	2	2	-	-
6.	Dissertation Phase	-	-	12	12
Actual Credits per Semester		28	28	12	12
Total actual Programme Credits					80
7.	Virtual Credited Comprehensive Viva	4	4	4	4
Total Credits per Semester		32	32	16	16
Total Programme Credits					96

**M. E. Computer Engineering (FULL TIME) With Specialization in
Software Engineering
Curriculum & Syllabus
Batch 2015– 2016 and Onwards**

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	SER1C1	Advanced Algorithms	3-1-1	PC1
2.	SER1C2	Object Oriented Analysis & Design	3-1-1	PC2
3.	SER1C3	Software Construction	3-1-1	PC3
4.	SER1Gx	Generic Elective I	3-1-0	GE1
5.	SER1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	SER1W1	Seminar/ Workshop/Research Tool	0-2-0	
8.	SER1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I			L-T-P	
1.	SER1G1	Soft Computing	3-1-0	
2.	SER1G2	Distributed Operating System	3-1-0	
3.	SER1G3	Advance Computer Architecture	3-1-0	
List of Elective I			L-T-P	
1.	SER1E1	Database Engineering	3-1-1	
2.	SER1E2	Big Data Analytics	3-1-1	
3.	SER1E3	Secure Software Engineering	3-1-1	
SEM II			L-T-P	
1.	SER2C1	Software Project Planning and Management	3-1-1	PC4
2.	SER2C2	Design Pattern	3-1-1	PC5
3.	SER2C3	Software Testing and Quality Assurance	3-1-1	PC6
4.	SER2Gx	Generic Elective II	3-1-0	GE2
5.	SER2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	

7.	SER2W2	Seminar/ Workshop/ Research Tool	0-2-0	
8.	SER2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
		List of Generic Elective II	L-T-P	
1.	SER2G1	Data Mining & Warehousing	3-1-0	
2.	SER2G2	Cloud Computing	3-1-0	
3.	SER2G3	Simulation and Modelling	3-1-0	
		List of Elective II	L-T-P	
1.	SER2E1	Speech And Language Processing	3-1-1	
2.	SER2E2	Aspect Oriented Software Engineering	3-1-1	
3.	SER2E3	Machine Learning	3-1-1	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER1C1	L	T	P	L	T	P	Total
Advanced Algorithms	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

Prerequisites: Data Structures and Algorithms.

COURSE CONTENTS

UNIT - I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

UNIT - II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Traveling Salesperson Problem (TSP), etc.

Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

UNIT - III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

UNIT - IV

Introduction to string matching problem, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc. Applications in Bioinformatics.

Computational Geometry: Convex Hull. Line-segment Intersection. Sweep Lines. Voronoi Diagrams. Range Trees. Seidel's Low-dimensional LP Algorithm.

UNIT - V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Learning Outcomes:

Upon Completing the Course, Student will have:

1. Skills to analyze algorithms
2. Comparative judgments of different design techniques
3. Ability to solve real world problems
4. Idea about the hardness of some well-known problems including TSP, vertex cover, network flow and combinatorial optimization problems.
5. Familiarity with active research areas in connection with the study of algorithms.

BOOKS RECOMMENDED:

- [1] T. Cormen, C. Leiserson, R. Rivest, and C. Stein. **Introduction to Algorithms**. (3rd Ed). MIT Press, McGraw-Hill, 2010.
- [2] M.T. Goodrich, R. Tamassia, “Algorithm design – Foundations, Analysis, and Internet Examples”, John Wiley, Second Edition.
- [3] V. V. Vazirani, **Approximation Algorithms**, Springer. 2001.
- [4] Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, **Network Flows: Theory, Algorithms, and Applications**,
- [5] E Horowitz, S salmi, S Rajasekaran, “Fundamentals of Computer Algorithms”, Second Edition, University Press, 2007.
- [6] Aho, A V Hopcraft Ullman JD, “The Design and analysis of computer Algorithms”, Pearson Education, 2007.

LIST OF PRACTICAL ASSIGNMENTS:

Practical assignments will be based on:

1. Performance analysis
2. Solving problems using design techniques discussed
3. Solution of network flow problems
4. Approximation algorithms
5. String matching algorithms
6. Combinatorial optimization problems
7. TSP problem
8. solving some real world problems using the skill gained in the course
9. study of NP-Complete, NP-Hard problems

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SE1C2 Object Oriented Analysis and Design	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

This course offers the opportunity to students to become skilled at the object oriented analysis and design. This is essential as it is the core of the software development process. This course shall help the student to comprehend the principles of object orientation and apply them as the solution for the real life problems in the form of object oriented design. At the end of the course the students shall be able to design a solution which works and solves software development problems.

Pre requisites:

1. Programming knowledge in any of the object oriented languages like C++, Java.
2. Familiarity and ease with data structures.

Unit I: Introduction to Modelling and UML 2.X

Importance of Modelling, Principles of Modelling, Object Oriented Modelling, Conceptual model of the UML, Architecture, Software Development Life Cycle

Unit 2: Basic and Advanced Structural Modelling

Basic Structural Modelling: Classes, Relationships, Common Mechanisms and Diagrams.

Advanced Structural Modelling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages

Unit 3: Class & Object Diagrams

Class & Object Diagrams: Terms, Concepts, Modelling Techniques for Class and Object Diagrams

Unit 4: Basic Behavioural Modelling

Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Events and Signals, State Machines, Processes and Threads, Time and Space Diagram, State Chart Diagrams

Unit 5: Architectural Modelling

Architectural Modelling: Component, Deployment, Component Diagrams and Deployment Diagrams, Case Study, Issues in OO Testing

TEXT BOOKS:

- [1] Grady Booch, James Rumbaugh, IvarJacobson : The Unified Modeling Language User Guide, Pearson Education.

REFERENCE BOOKS:

- [1] 1.Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
[2] Pascal Roques: Modelling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
[3] AtulKahate Object Oriented Analysis & Design, The McGraw-Hill Companies.
[4] Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

Learning Outcomes

- Students become skilled at the object oriented analysis and design. This is essential as it is the core of the software development process. student will be comprehend the principles of object orientation and apply them as the solution for the real life problems in the form of object oriented design. Students shall be able to design a solution which works and solves software development problems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER1C3	L	T	P	L	T	P	Total
Software Construction	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Outcomes:

The aim of the course is to help the student be able to understand the real world problems. The student shall be able to solve the complexity of the problem and also depict the problem with the help of standard UML diagrams. In the process of software design the student shall be able to appreciate the application of diagrams, iterative approach which helps in improving the software quality.

Objective: To gain the knowledge for advance programming using JAVA

UNIT I

Object Oriented Concepts, Merits of Object Oriented Technology. Introduction to JAVA and its applications on the Internet. Constructors & constructor overloading, Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT II

Introduction to Java classes and objects, Java features, data types data type conversions & control statements Operators and their precedence. Introduction to Class, Instance members and member functions.

UNIT III

String Handling, Wrapper classes Arrays and Vectors Inheritance and Polymorphism Class relationships Inheritance and its types Merits and Demerits of Inheritance Introduction to Association, inheritance Polymorphism Dynamic method dispatch Runtime polymorphism Abstract classes, Interfaces packages

UNIT IV

Java I/O, Basic concept I/O stream reader-writer Exceptions: Need forexceptions Checked exceptions Unchecked exceptions Creating exceptions Multithreading Introduction, Priorities and scheduling of Threads Thread Synchronization and its life cycle Applet and its Life Cycle

UNIT V

Server side programming:- Java servlets, Java Server pages, Web application development using Java, Database handling with Java.

Text Books:

[1] T1: Herbert Schildt, Java: The Complete Reference, 8th Edition

[2] T2: Programming with java by e Balagurusamy

Learning Outcomes:

- The aim of the course is to help the student be able to understand the real world problems. The student shall be able to solve the complexity of the problem and also depict the problem with the help of standard UML diagrams. In the process of software design the student shall be able to appreciate the application of diagrams, iterative approach which helps in improving the software quality.

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Subject Code & Name	Instructions Hours per Week			Credits			
SER1G1	L	T	P	L	T	P	Total
Soft Computing	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To familiarize with neural networks and learning methods for neural networks.
2. To introduce basics of genetic algorithms and their applications in optimization and planning.
3. To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
4. To develop skills thorough understanding of the theoretical and practical aspects .

Pre requisites: Analysis of Algorithm, Artificial Intelligence.

COURSE CONTENTS

UNIT-I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing ,Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

UNIT-II

NEURAL NETWORKS

Backpropagation Networks, Architecture: perceptron model, single layer artificial neural network, multilayer perception model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

UNIT-III

GENETIC ALGORITHMS

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems. Simulated annealing and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

UNIT-IV

FUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfication&Defuzzification, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-V

NEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification , Neuro Fuzzy Control , Case studies.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply neural networks to pattern classification and regression problems
3. Recognize the feasibility of applying a soft computing methodology for a particular problem
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problems.

BOOKS RECOMMENDED:

- [1] S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.
- [2] Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
- [3] Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence - Bart Kosko, Prentice Hall, 1992.
- [4] Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
- [5] David E. Goldberg, "Genetic Algorithms in search, Optimization & Machine Learning", Addison-Wesley, 1997.
- [6]

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SER1G3	L	T	P	L	T	P	Total
ADVANCE COMPUTER ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To familiarize with current trends in high performance computing.
2. To introduce quantitative analysis of computer architectures

Pre requisites: Computer organization

Unit 1 : Introduction to Computer Architecture& Quantitative Analysis

Generations of Computers, Definition of Computer Architecture, General trends in technology, power and cost. Measuring, Reporting, and Summarizing performance. Quantitative principles of computer design.

Unit 2 : Pipelining & Instruction level Parallelism

Need of pipelining, Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards, pipeline extension to support multicycle operations. Concepts and challenges in ILP, Compiler techniques for ILP, Dynamic Scheduling, and Hardware based Speculation, Combining dynamic scheduling, multiple issue and speculation.

Unit 3 : Memory Hierarchy Design

Introduction, Optimizations for improving Cache performance, Memory technology and optimizations, Virtual Memory protection and performance issues, Virtual machines protection.

Unit 4 : Data level Parallelism and Thread level Parallelism

Introduction, Vector architecture, Graphics Processing Units, Detecting and enhancing loop-level parallelism, Centralized shared memory architecture, Shared Memory multiprocessors performance, distributed shared memory and directory-based coherence, models of memory consistency.

Unit 5 : Interconnection Networks

Introduction, Connecting two or more devices, network topology, network routing, arbitration, and switching, Examples of interconnection networks, internetworking issues.

Case Study: MIPS Processor

Books Recommended

- [1] J. Hennessy & D. Patterson, Computer Architecture : A Quantitative Approach, Morgan Kaufmann Series, 5th Edition, 2011.
- [2] Kai Hwang, Advance Computer Architecture: Parallelism, Scalability, Programmability, Mcgraw Hill Computer Science Series, 1992.
- [3] D. Sima& T. Fountain & P. Kacsuk, Advance Computer Architectures : A Design Space Approach, 1st Edition, Pearson Education, 2002.
- [4] J. Hayes, Computer Architecture and Organization, Mcgraw Hill Education Series (India), 2012.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Learn the current trends in high performance computing.
- Learn the quantitative analysis of computer architectures
- Learn about Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards
- Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards
- Vector architecture, Graphics Processing Units, Detecting and enhancing loop-level parallelism,

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Subject Code & Name	Instructions Hours per Week			Credits			
SER1E1	L	T	P	L	T	P	Total
DATABASE ENGINEERING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand how transactions are executed and concurrency mechanisms are used in practice.
- To understand how DBMS process queries and how it estimates the cost of query optimization.
- To understand how DBMS maintains data records and access paths.
- To understand the need and use of distributed database systems in practice.
- To familiarize with the emerging technologies of databases.

Prerequisites: Introductory knowledge of Database Systems.

COURSE CONTENTS

Unit-I

Transaction Processing & Concurrency Control: Introduction to Transaction Processing, Transaction Properties, Transaction recoverability and serializability, Transaction Support in SQL, Introduction to Concurrency Control, Two-phase locking, Timestamp ordering, Validation and other issues.

Unit-II

Query Processing & Optimization: Introduction, Translating SQL queries, Algorithms – External Sorting, Select, Join and Project operations, Aggregate and Outer Joins, Heuristics for Query optimization, Estimating cost in query optimization, Semantic optimization, Optimization used in practice.

Unit-III

Data Storage and Querying: File organization, Organization of records, Indexing and Hashing – Basic concepts, B+-tree index files, Static and dynamic hashing, comparison of indexing and hashing etc..

Unit-IV

Distributed Databases: Concepts, Techniques for Distributed database design – Data fragmentation, replication, and allocation techniques; Types of Distributed Systems, Query processing in Distributed Databases, Concurrency control & Recovery in Distributed Databases, Distributed Databases in MySQL.

Unit-V

Advance Topics: Information Retrieval and XML data, Spatial data management, NoSQL – Differences from Relational Databases, Theory, Key-Value Databases, Graph Databases etc.

Books Recommended:

- [1] Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
- [2] Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
- [3] Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
- [4] Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.

List of Assignments:

During the learning of course, students need to do assignments:

1. Solving intermediate SQL queries involving join expressions, views and transaction support.
2. Using PL/SQL constructs involving procedures, triggers, recursive queries etc.
5. Assignment on Query processing and indexing.
4. Using concurrency and transactions
6. Distributed database support in MySQL or PostgreSQL.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand how transactions are executed and concurrency mechanisms are used in practice.
- Understand how DBMS process queries and how it estimates the cost of query optimization.
- Understand how DBMS maintains data records and access paths.
- Understand the need and use of distributed database systems in practice.
- Understand and familiarize with the emerging technologies of databases.

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Subject Code & Name	Instructions Hours per Week			Credits			
SER1E2	L	T	P	L	T	P	Total
Big data analytics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

LEARNING OBJECTIVES:

1. To increase knowledge of the Big Data landscape.
2. Develop a comprehensive knowledge R and to use R for effective data analysis.
3. Develop skills in independent managing Big data projects and related issues.
4. Develop ability to carry out research in area of Big Data.

Pre requisites: Some programming experience (in any language) is recommended.

COURSE CONTENTS

UNIT-I

Introduction to Big Data: Overview of Big Data, Characteristics of Big Data, Sources of Big data, Five V's of Big Data, Examples of Big Data, Advantages of Big Data, Big Data Applications, Strategies of Big Data, challenges Process of Data Analysis.

UNIT II

Introduction R : Overview and History of R, R Console Input and Evaluation, Data Types - R Objects and Attributes, Vectors and Lists, Matrices, Factors, Missing Values, Data Frames, Names Attribute, Reading Tabular Data, Reading Large Tables, Textual Data Formats, Connections: Interfaces to the Outside World.

Unit III

Programming with R: Subsetting – Basics, Lists, Matrices, Partial Matching, Removing Missing Values, Vectorized Operations. Control Structures - If-else, For loops, While loops, Repeat, Next, Break, Functions, Scoping Rules - Symbol Binding, R Scoping Rules, Coding Standards, Dates and Times

Unit IV

Loop Functions and Debugging : Loop Functions – lapply, apply, mapply, tapply, split, Debugging Tools - Diagnosing the Problem, Basic Tools, Using the Tools

Unit V

Developing Data Products :Introduction to Data Products, Intro to rCharts and GoogleVis, rCharts introduction, rCharts examples, rCharts mapping, GoogleVis, plotly, Interactive graphics

LEARNING OUTCOMES:

Upon completing the course, students will be able to:

- Apply Knowledge of Big Data to solve real world big data problems.
- Understand the fundamentals of 'R' programming
- Work on a real life Project, implementing R Analytics to create Business Insights.
- Apply Data Visualization to create fancy plots
- Undergo into further research in Big Data.

BOOKS RECOMMENDED:

- [1] Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Michael Minelli, Michele Chambers, AmbigaDhira, [Wiley India Pvt Ltd](#), 2013.
- [2] R for Everyone: Advanced Analytics and Graphics, 1st Ed., Jared P. Lander, Pearson Education, Inc., 2014.
- [3] Big Data Analytics with R and Hadoop, Vignesh Prajapati, [Packt Publishing Ltd](#), 2013.
- [4] Big Data Analytics: Turning Big Data into Big Money, [Frank J. Ohlhorst](#), Wiley, 2012.
- [5] Creating Value with Big Data Analytics: Making Smarter Marketing Decisions, Peter C. Verhoef, Edwin Kooge, Natasha Walk, Taylor & Francis, 2016.

List of Practical/ Programming Assignments: (if applicable)

During the learning of course, students need to do assignments:

- 1 To learn the R Programming language.
- 2 To explore Rstudio for solving the Big data problems.

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Subject Code & Name	Instructions Hours per Week			Credits			
SER2C1	L	T	P	L	T	P	Total
Software Project Planning and Management	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course provides the knowledge for correct software development life cycle, create realistic project plans, and manage a software development team through each phase of the project. The purpose of software project planning and management is to forecast many hazards and risks and problems as possible. The student shall be to plan, organize and control activities so that the project is completed as successfully as possible in spite of all the risks.

Pre-requisites:

A course on software engineering and practical experience of handling college projects.

COURSE CONTENTS

UNIT-I: Introduction to Software Project Management

Project Definition, Contract Management, Activities Covered by Software Project Management, Overview of Project Planning, Stepwise Project Planning

UNIT-II: Project Evaluation

Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation

UNIT-III: Activity Planning

Objectives, Project Schedule, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass, Backward Pass , Activity Float, Shortening Project Duration , Activity on Arrow Networks , Risk Management , Nature of Risk , Types of Risk , Managing Risk , Hazard Identification , Hazard Analysis , Risk Planning and Control.

UNIT-IV: Monitoring and Control

Creating Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Managing Contracts, Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management , Acceptance.

UNIT-V: Managing People and Organizing Teams Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation, The Oldman, Hackman Job

Characteristics Model, Working In Groups, Becoming a Team, Decision Making, Leadership, Organizational Structures, Stress, Health and safety, case studies.

Text Books:

1. Bob Hughes, Mike Cotterell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

REFERENCE Books

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, "Software Project Management", Pearson Education, 1999.
3. Jalote, "Software Project Management in Practice", Pearson Education, 2002.

Learning Outcomes:

The aim of the course is to help the student to be a responsible member of the software development team. The student after completion of the course shall be able to comprehend project problems and apply the knowledge on projects and software development. The student also shall be aware of the conditions and constraints such as resources, time, cost and quality.

Learning Outcomes:

- The aim of the course is to help the student to be a responsible member of the software development team. The student after completion of the course shall be able to comprehend project problems and apply the knowledge on projects and software development. The student also shall be aware of the conditions and constraints such as resources, time, cost and quality

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2C2	L	T	P	L	T	P	Total
Design Pattern	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To strengthen the knowledge of Object Oriented Design and Development by understanding various design patterns.

Pre requisites: Knowledge of object oriented system concepts, object oriented analysis and modeling and object oriented programming.

COURSE CONTENTS

UNIT-I

Introduction to Software Patterns, Overview of UML, Class Diagrams, Collaboration Diagrams, State chart Diagram, Deployment Diagram, Fundamental Design Patterns: Delegation, Interface, Abstract Super-class, Interface and Abstract class, Immutable, Marker Interface.

UNIT-II

Simple Factory pattern, Factory Method, Abstract Factory, Builder, Prototype, Singleton

UNIT-III

Adaptor, Bridge, Composite, Façade, Flyweight, Decorator, Proxy Pattern

UNIT-IV

Chain of Responsibility, Command, Interpreter, Mediator, Memento Pattern

UNIT-V

Observer, State, Strategy, Template Method, Visitor, Iterator Pattern.

Learning Outcomes: To learn Various Design Patterns and learn their application in real software development..

BOOKS RECOMMENDED:

- [1]. Gamma, Helm, Johnson, Vlissides, Design Patterns. Elements of Reusable Software., Pearson Education 2006
- [2]. Cooper, J. W., Java Design Patterns, A Tutorial, Pearson Education, 2000.
- [3]. Freeman, Freeman, Head First Design Patterns, O'Reilly Pub. 2007
- [4]. Mark Grand, Patterns in Java Vol. 1, Wiley 2002
- [5]. Mark Grand, Patterns in Java Vol. 2, Wiley 2002
- [6]. Mark Grand, Patterns in Java Vol. 3, Wiley 2002
- [7]. Douglas Schmidt, Pattern Oriented Software Architecture Vol1, John Wiley 2000, also called as POSA

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SER2C3	L	T	P	L	T	P	Total
Software Testing & QA	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To develop a skill in developing good quality in the software product.

Pre requisites: Basic knowledge of software Engineering and programming.

COURSE CONTENTS

UNIT-I

SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics – Various software development Life cycles (SDLC) –Principles of testing.

UNIT-II

WHITE BOX TESTING White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis

UNIT-III

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing- Integration Testing

UNIT-IV

TESTING STRATEGIES: System testing - Functional testing-non-Functional testing-acceptance testing-performance testing –Factors and Methodology for Performance testing, Regression testing-Methodology for Regression-testing.

UNIT-V

ADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING): Syntax testing - Finite state testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

Learning Outcomes: To learn to Software Testing & QA concepts and its approaches to software Testing and QA.

BOOKS RECOMMENDED:

- [1]. Srinivasan Desikan&Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education, 2006
- [2]. R. Patton; Software Testing; Techmedia (SAMS) 2000
- [3]. GlenfordJ.Myers, " The Art of Software Testing ", John Wiley & Sons, 1979.
- [4]. Boris Beizer, Black-Box Testing: “Techniques for Functional Testing of Software and Systems ", John Wiley & Sons, 1995.
- [5]. P.C.Jorgensen, “Software Testing - A Craftsman’s Approach ", CRC Press, 1995.
- [6]. Robert V.Binder, " Testing Object-Oriented Systems: Models Patterns and Tools ", Addison Wesley, 2000.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2E1	L	T	P	L	T	P	Total
Speech andLanguageProcessing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Prerequisite: Discrete structures, Finite automata, information retrieval and Context-free Grammar

SPEECH ANDLANGUAGEPROCESSING

UNITI

Natural Language Processing, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNITII

Computational Phonology: speech sound, phonetic transcription, text to speech; Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-grams.

UNITIII

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNITIV

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, WordNet.

UNITV

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

TEXTBOOKS:

- [1] D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.
- [2] 2. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",
- [3] JamesAllen."NaturalLanguage Understanding",AddisonWesley,1994.

Learning Outcomes:

- Will able to solve Problem based on Stemming Algorithm.
- Will able to solve Problem based on Part of Tagging.
- Will able to solve Problem based on Parsing.
- Will able to solve Problem based on Information Retrieval.
- Will able to solve Case study on Different NLP Techniques
- Can build Cricket Game Prediction application
- Will able to solve Machine Translation from English-Hindi.
- Will able to solve Query Expansion for Information Retrieval.
- Will able to solve Emotion detection for texts.
- Will able to solve Any other problem based on emerging trends in speech & language processing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2E3	L	T	P	L	T	P	Total
Machine Learning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning,

Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III

Unsupervised Learning: Introduction to unsupervised learning -Clustering -Classification of clustering algorithms: K-Means and EM -Factor Analysis: PCA (Principal Components Analysis) and ICA (Independent Component Analysis) -Self-Organized Maps (SOM) and Multi-dimensional Scaling.

Unit-IV

Computational Learning theory, Introduction, PAC Learning, VC dimension, Support Vector Machines (SVM), Genetic Algorithm (GA), illustrative examples for SVM and GA.

Unit-V

Artificial Neural Networks Learning, Introduction, Neural Network Representation, Perceptron, Backpropagation algorithm, Examples of Neural Network Learning.

RECOMMENDED BOOKS

- [1] Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- [2] Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- [3] Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- [4] David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

- **Problem based on different machine Learning algorithm**
- **Works on different machine learning Tools**
- **Case Study on different data sets**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2E2 Aspect Oriented Software Engineering	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

The objective of this course is to master basics of aspect-oriented software development, which enables a higher degree of the separation of concerns through crosscutting concern modularization. The course provides an overview of aspect-oriented approaches to software development throughout all of its stages, as well as programming languages connected with these approaches. The course also covers the relationship of aspect-oriented software development and software product lines. Students will gain experience with AspectJ, which is the most important aspect-oriented programming language of today.

Pre-requisite:

Familiarity with Object oriented programming, Object oriented design, UML is essential.

COURSE CONTENTS

Unit 1: Introduction to AOSD

This module provides a broad overview of aspect orientation. It introduces students to the aspect-oriented paradigm's origins and foundations, providing a solid basis and a common terminology to be used in subsequent modules. The fundamental concepts include all major elements of the paradigm: separation of concerns, crosscutting concerns, modularization, aspects, join points, point cuts, advice, and aspectual composition. Module 1's only prerequisite is knowledge of software engineering in some existing, well known paradigm.

Unit 2: Aspect-oriented analysis and design

This module covers a broad spectrum of software development activities, from initial requirements definition to architecture derivation and detailed design production. Each of these life-cycle stages can be realized using various aspect-oriented approaches. This module underlines the problems of tangling and scattering caused by crosscutting concerns in non aspect-oriented analysis and design approaches. It also presents aspect-oriented approaches for aspect identification, modularization, and composition, using several case studies for illustration. An in-depth experience with a particular analysis and design technique and its related tools is a final

important goal of the module. Students achieve hands-on experience of aspect-oriented analysis and design through exercises. The prerequisites are Module 1 and familiarity with some requirements engineering, architecture, and design approaches. Knowledge of object-oriented (OO) analysis and design techniques (including UML) is desirable.

Unit 3: Aspect-oriented programming

Several AOP languages exist today, and most are extensions of existing languages. This module focuses on hands-on experience, giving special care to programming practices in AOP. The module covers various aspect languages, highlighting their differences and commonalities to teach students to abstract from concrete languages and understand aspect orientation's essential mechanisms. It also touches on implementing aspect language execution models to help students better understand the impact of aspects on program execution (for example, in terms of performance). The prerequisites are Module 1 and experience in or knowledge about software implementation by means of contemporary languages, preferably in the OO paradigm.

Unit 4: Aspect-oriented applications

Module 5 illustrates the practical use of various aspect-oriented technologies, such as programming languages, aspect-oriented analysis and design, and more generally, any software engineering methodology that embraces aspects. It presents case studies of applications that benefit from AOSD, covering system level elements (such as middleware) and end-to-end user applications (such as e-banking or e-government applications). The module's main subject isn't technologies that create system-level elements and end-to-end user applications; Modules 2 and 3 will have covered these. The prerequisites are Module 1 and, depending on the instantiation, Module 2 and/or Module 3.

Unit 5: AOSD and other paradigms

Aspects are always used in a context. Therefore, to develop applications using aspect-oriented techniques, it's important to relate AOSD to the development paradigms, methodologies, and programming languages that you used to implement the underlying base application. AOSD's context is almost always class-based object orientation. However, as AOSD spreads to other contexts, this relationship will diversify and become more important. Also, other advanced development paradigms have been developed that can be related to AOSD, either because they're complementary or because they target the same problems as AOSD (albeit differently). This module provides insights into the relationship between AOSD and these other advanced development paradigms (for example, development methodologies other than the OO paradigm), different general-purpose programming languages for the base code, and component-oriented software engineering. The prerequisites are Module 1 and at least one other module.

Text Books:

1. Ivar Jacobson and Pan-Wei Ng. Aspect-Oriented Software Development with Use Cases. Addison-Wesley, 2004.
2. RamnivasLaddad. AspectJ in Action: Enterprise AOP with Spring Applications. Second edition, Manning, 2009.
3. Mastering AspectJ: Aspect-Oriented Programming in Java By Joseph D. Gradecki, Nicholas Lesiecki, Wiley 2003

Reference Books:

1. Robert E. Filman et al. Aspect-Oriented Software Development. Addison-Wesley, 2004.
2. Siobhan Clarke and Elisa Baniassad. Aspect-Oriented Analysis and Design: The Theme Approach. Addison-Wesley, 2005.
3. Aspect-oriented Programming with AspectJ. Ivan Kiselev, Sams, 2003

Learning Outcomes:

The students after completion of the course shall be having the knowledge of aspect-oriented software development, which enables a higher degree of the separation of concerns through crosscutting concern modularization. Students will be able to build solutions with AspectJ on completion of the course.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2G1	L	T	P	L	T	P	Total
Data Mining & Warehousing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives:

- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models.

Unit-I

Data Mining -Introduction: Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Knowledge Discovery in Databases (KDD), KDD Process, Data Pre-processing, Data Cleaning, Data Transformation, Data Compression and Dimension Reduction, Principal Component Analysis, Binning Methods.

Unit-II

Data Warehousing –Introduction and Design: Overview and Concepts: Need for data warehousing, basic elements of data warehousing, Architecture and Infrastructure: Architectural components, Infrastructure and metadata. Data Design And Data Representation: Principles of dimensional modelling, Dimensional modelling, data extraction, transformation and loading, data quality. OLAP in data warehouse –ROLAP, MOLAP, HOLAP. OLTP Vs OLAP, Various Data Warehouse Schemas.

UNIT-III

Association & Classification Techniques: Introduction, Frequent itemset mining methods – Apriori, FP-Growth, Pattern evaluation methods, Basic concepts of classification, Decision tree induction, Bayes classification, Rule-based classification.

UNIT-IV

Clustering Techniques: Introduction, Clustering paradigms; Partitioning algorithms – K-Means, K-Medoid, CLARA; Partition based clustering – BIRCH; Density based clustering - DBSCAN; Categorical clustering algorithms, Evaluation of Clustering.

UNIT-V

Other DM techniques & Web Mining: Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends. Web Mining : Introduction Web content mining, Web structure Mining, Web Usage Mining.

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis.

Reference Books:

1. Data Mining Techniques; ArunK.Pujari ; University Press.
2. Data Mining Concepts and Techniques, Jiawei Han Micheline Kamber,Jianpei, Morgan Kaufmann.
3. Data Mining; Adriaans&Zantinge; Pearson education.
4. Mastering Data Mining; Berry Linoff; Wiley.
5. PaulrajPonniah, “Data Warehousing Fundamentals”, John Wiley.
6. Text Mining Applications, Konchandy, Cengage

Learning Outcomes:

- Will able to develop the abilities of critical analysis to data mining systems and applications.
- Will able to develop practical and theoretical understanding of the technologies for data mining
- Understand the strengths and limitations of various data mining models.

ME (Information Technology) with Specialization in Information Security
Proposed Scheme for CBCS (Full Time)

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	ISR1C1	Advanced Algorithms	3-1-1	PC1
2.	ISR1C2	Secure Computing Techniques	3-1-1	PC2
3.	ISR1C3	Advanced Computer Networks	3-1-1	PC3
4.	ISR1Gx	Generic Elective I	3-1-0	GE1
5.	ISR1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	ISR1W1	Seminar/ Workshop-I	0-2-0	
8.	ISR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I			L-T-P	
1.	ISR1G1	Advanced Data Base Management Systems	3-1-0	
2.	ISR1G2	Complexity of Security Algorithms	3-1-0	
3.	ISR1G3	Agent Technology	3-1-0	
List of Elective I			L-T-P	
1.	ISR1E1	Data Security	3-1-1	
2.	ISR1E2	Information Theory and Coding	3-1-1	
3.	ISR1E3	Data Compression and Stagnography	3-1-1	
SEM II			L-T-P	
1.	ISR2C1	Information Security Management	3-1-1	PC4
2.	ISR2C2	Digital Forensics and Security Audit	3-1-1	PC5
3.	ISR2C3	Secure Wireless Networks	3-1-1	PC6
4.	ISR2Gx	Generic Elective II	3-1-0	GE2
5.	ISR2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	ISR2W2	Seminar/ Workshop-II	0-2-0	
8.	ISR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II			L-T-P	
1.	ISR2G1	Cloud Computing	3-1-0	
2.	ISR2G2	Applied Cryptography	3-1-0	
3.	ISR2G3	Cyber Crime and Information Warfare	3-1-0	
List of Elective II			L-T-P	
1.	ISR2E1	Biometric Systems & Security	3-1-1	
2.	ISR2E2	Secure Software Engineering	3-1-1	
3.	ISR2E3	Trust management in E- Commerce	3-1-1	

Devi Ahilya University, Indore, India			ME I Year Information Technology				
Institute of Engineering & Technology			(Sp. Information Security)				
			Semester- A				
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR1C1: Advanced Algorithms	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

COURSE CONTENT

Unit I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

Unit II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Travelling Salesperson Problem (TSP), etc. Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

Unit III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

Unit IV

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

Unit V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Text and Reference books:

6. T. Cormen, C. Leiserson, R. Rivest, and C. Stein. Introduction to Algorithms. (3rd Ed). MIT Press, McGraw-Hill, 2010.
7. M.T. Goodrich, R. Tamassia, "Algorithm design – Foundations, Analysis, and Internet Examples", John Wiley, Second Edition.
8. V. V. Vazirani, Approximation Algorithms, Springer. 2001.
9. Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, Network Flows: Theory, Algorithms, and Applications,
10. E Horowitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, University Press, 2007.

11. Aho, A V Hopcraft Ullman JD, “The Design and analysis of computer Algorithms”, Pearson Education, 2007.

Course outcomes:

After the completion of course student will be able to:

Perform variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarize the state of the art in some areas of algorithmic research, including open problems.

Devi Ahilya University, Indore, India			ME I Year Information Technology (Sp. Information Security) Semester- A				
Institute of Engineering & Technology							
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR1C2: Secure Computing Techniques	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

This course aims to provide an understanding of the various security attacks and knowledge to recognize and remove common coding errors that lead to vulnerabilities. It gives an outline of the techniques for developing a secure application.

COURSE CONTENT

Unit-I: Introduction

Security: CIA (AIC) Triad, Viruses, Trojans, and Worms In a Nutshell, Security Concepts- exploit, threat, vulnerability, risk, attack. *Malware Terminology:* Rootkits, Trapdoors, Botnets, Key loggers, Honeypots. Active and Passive Security Attacks, IP Spoofing, Tear drop, DoS, DDoS, XSS, SQL injection, Smurf, Man in middle, Format String attack. *Types of Security Vulnerabilities:* buffer overflows, invalidated input, race conditions, access-control problems, weaknesses in authentication, authorization, or cryptographic practices. Access Control Problems.

Unit-II: Secure Software Development Cycle & Threat Modelling

Need for Secure Systems: Proactive Security development process, Secure Software Development Cycle (S-SDLC) , Security issues while writing SRS, Design phase security, Development Phase, Test Phase, Maintenance Phase, Writing Secure Code – Best Practices SD3 (Secure by design, default and deployment), Security principles and Secure Product Development Timeline.

Identifying the Threats by Using Attack Trees and rating threats using DREAD, Risk Mitigation Techniques and Security Best Practices. Security techniques, authentication, authorization. Defence in Depth and Principle of Least Privilege.

Unit – III: Secure Coding Techniques

Protection against DoS attacks, Application Failure Attacks, CPU Starvation Attacks, *Insecure Coding Practices in Java Technology:* ARP Spoofing and its countermeasures. Buffer Overrun- Stack overrun, Heap Overrun, Array Indexing Errors,FormatString Bugs. *Security Issues in C/C++ Language:* String Handling, Avoiding Integer Overflows and Underflows and Type Conversion Issues- Memory Management Issues, Code Injection Attacks,Canary based countermeasures using StackGuard and Propolice. Socket Security, Avoiding Server Hijacking, Securing RPC, ActiveX and DCOM. Secure coding issues in Android Applications, Language Specific issues like C/C++, Perl, Python, Scripting Languages, Ada, Java, PHP etc.

Unit – IV: Database and Web-specific issues

SQL Injection Techniques and Remedies,Race conditions, Time of Check Versus Time of Use and its protection mechanisms. Validating Input and Interprocess Communication, Securing Signal Handlers and File Operations. XSS scripting attack and its types – Persistent and Non persistent attack XSS Countermeasures and Bypassing the XSS Filters.

Unit – V: Testing Secure Applications

Security code overview, secure software installation. The Role of the Security Tester, Building the Security Test Plan. Testing HTTP-Based Applications, Testing File-Based Applications, Testing Clients with Rogue Servers.

Text and Reference books:

- Writing Secure Code, Michael Howard and David LeBlanc, Microsoft Press, 2nd Edition, 2004
- Buffer Overflow Attacks: Detect, Exploit, Prevent by Jason Decker, Syngress, 1st Edition, 2005
- Threat Modeling, Frank Swiderski and Window Snyder, Microsoft Professional, 1st Edition, 2004.
- Secure Programming HOWTO by David A. Wheeler
- Secure Coding: Principles & Practices by Mark G. Graff, Kenneth R. van Wyk

Course outcomes:**After the completion of course student will be able to:**

Have understanding of the various security attacks and knowledge to recognize and remove common coding errors that lead to vulnerabilities. It gives an outline of the techniques for developing a secure application.

Devi Ahilya University, Indore, India			ME I Year Information Technology (Sp. Information Security) Semester- A				
Institute of Engineering & Technology							
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR1C3: Advanced Computer Networks	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

Provide students with enhance base of knowledge of Computer Networks, Develop a comprehensive knowledge of Tools and Techniques used in Management of Computer Networks, Develop skills in independent managing Network Performance related issues Develop ability to carry out research in area of Computer Networks

COURSE CONTENT

Unit I : Foundation

Computer Networks and Internet, Structure of network software in an operating system, Packet Switching and Circuit Switching, Protocols Layers and Network Service Models, Implementing Network Software (Sockets), Network Performance - Delay, Loss , Throughput, and Bandwidth, Best-effort services and QoS guarantees for multimedia data.

Unit II : Link Layer, Access Networks and LANs

Services Provided by Link Layer, Link Layer Implementation, Multiple Access Protocols and Ethernet, Switched Local Area Networks, Link Layer Addressing (ARP), RARP, VLANs, Link Virtualization and MPLS, Data Center Networking

Unit III : Network Layer and Internetworking

Virtual Circuit and Datagram Networks, Internet Protocol, IPV4 -Class full and Classless Addressing, Subnetting, IPV6 Addressing, IP Datagram delivery and forwarding, Routing Algorithms- Distance Vector and RIP, Link State Routing and OSPF, Inter domain Routing - BGP, DHCP, ICMP, Router-switching, input/output processing, Routing Control Plane, Network Virtualization- VPN and NAT.

Unit IV : Transport Layer and End-to-End Protocols

Transport layer services in Internet, Multiplexing and De-multiplexing, Connectionless Transport: UDP segment format and checksum, Connection Oriented Transport: TCP-segment format, roundtrip estimation and Timeout, Reliable data Transfer, Flow control, TCP connection Management, TCP congestion control Additive Increase/Multiplicative Decrease, Slow start, Fast Retransmit and Fast Recovery, Fairness and Queuing Disciplines.

Unit V : Application Layer

Network Application Architecture and Process Communication, Web and HTTP, File Transfer FTP, Electronic Mail- SMTP, POP, IMAP, MIME, Internet Discovery Service-DNS, Network Management – SNMP, Advance topics - Software Defined Networking, Internet of Things

Text and Reference books:

- [1] Computer Networking, A Top-Down Approach, 6th Ed., J. Kurose and K. Ross, Pearson, 2013.
- [2] Computer Networks, A Systems Approach, 5th Edition, L. Peterson and B. Davie, Morgan Kaufman, 2012.
- [3] [3] Internetworking with TCP/IP Volume I, 6th Ed., D. E. Comer, Pearson Education, 2013.
- [4] Internetworking with TCP/IP Volume II, 3rd, Ed., D. E. Comer and David L. Stevens, Pearson Education, 2003.
- [5] Data Communications and Networking, 4th Ed., Beharouz A. Forouzan, McGraw-Hill Education Private Ltd., 2006.

Course outcomes:**After the completion of course student will be able to:**

Enhance base of knowledge of Computer Networks, Develop a comprehensive knowledge of Tools and Techniques used in Management of Computer Networks, Develop skills in independent managing Network Performance related issues Develop ability to carry out research in area of Computer Networks

Devi Ahilya University, Indore, India				ME I Year Information Technology			
Institute of Engineering & Technology				(Sp. Information Security)			
				Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR1G1: Advanced Database Management Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

To enhance the understanding of practical issues related to advance topics of Database systems.

COURSE CONTENT

Unit I : Introduction to Data Warehousing and Data Mining

Introduction to Knowledge discovery process, OLTP, OLAP, Data Mining: Functionalities, Process, Schemas and Applications etc.; Data Warehouse : Construction and other issues.

Unit II : Transaction Processing and Concurrency Control

Introduction, Properties; Schedules, Types of Schedules, Characterizing Schedules, Serializability, Two-phase locking, Dealing with Deadlock and Starvation, Time Stamp Ordering and Multi version Concurrency control etc.

Unit III : Data Storage, Indexing and Physical Database Design

Types of Files, Introduction to Hashing, Multilevel Indexes, B-trees, B+ -trees, Indexes on Multiple Keys, Overview of Physical Database Design and Database Tuning in Relational Databases

Unit IV : Query Optimization

Introduction to Query Optimization, Overview of algorithms used in External Sorting and other SQL operations, Use of Heuristics, Cost Estimation and Selectivity used in Query Optimization, Semantic Query Optimization etc.

Unit V : Distributed Databases and Security

Concepts, Types and Query Processing in Distributed Databases, Data Fragmentation, Replication and Allocation Techniques, Introduction to Database Security Issues, Access Control Policy, Statistical Database Security etc.

Text and Reference books:

1. Fundamentals of Database Systems, Elmasri and Navathe, Pearson Education, 6th Edition, 2014.
2. Data Mining Concepts and Techniques, Han and Kamber, Morgan Kauffman, 3rd Edition, India, 2012.
3. Database System Concepts, Silberchatz, Korth, Sudarshan, Mcgraw Hill, 6th Edition, 2010.
4. Database Systems : A practical Approach to Design, Implementation, and Management, Connolly and Begg, Pearson Education, 6th Edition, 2014.

Course outcomes:

After the completion of course student will be able to:

To enhance the understanding of practical issues related to advance topics of Database systems.

Devi Ahilya University, Indore, India				ME I Year Information Technology			
Institute of Engineering & Technology				(Sp. Information Security)			
				Semester- A			
Subject Code & Name		Instructions			Credits		
		Hours per Week					
ISR1E1: Data Security		L	T	P	L	T	P
							Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1
							5

Course Objective:

To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Foundation

Security Taxonomy, Domain of information security, security goals, security approaches, principles of security, security attacks, threats, vulnerabilities, malicious software's, virus, worms, Trojan, spy wares, Applets/Active X, cookies. Security services, mechanisms and security models. Types of attacks, packet sniffing, packet spoofing, IP sniffing, IP spoofing, DNS spoofing attack.

Unit II : Classical Cryptographic Techniques

Cryptography terminologies, classical cryptography: substitution techniques, transposition techniques, playfair cipher, Hill cipher. Mathematics of cryptography: Integer arithmetic, modular arithmetic, Euclid theorem, Concept of symmetric and asymmetric key cryptography, stenography, digital watermarking, key range and size, possible types of attacks. Stream ciphers and Block cipher. Algorithm type and modes. Key distribution, Diffie Hellman key exchange, Man in the middle attack.

Unit III : Symmetric Key Algorithms

Computer based symmetric key cryptographic algorithms: Data Encryption Standard (DES), Double DES, meet in the middle attack, Triple DES, International Data Encryption Algorithm (IDEA), RC5, Blowfish, Advance Encryption Standard (AES).

Unit IV : Asymmetric Key Algorithms

Random number generation, Prime numbers. Fermat's and Euler's theorem. Principles of public key cryptosystems. Computer based asymmetric key cryptographic algorithms: RSA algorithm. Principles of public key cryptosystems, symmetric and asymmetric key cryptography together. Concept of Digital Envelope, Digital signatures, message digests and its requirements.

Unit V : Public Key Cryptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.

Text and Reference books:

2. Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC
3. Williams Stallings; "Cryptography & Network Security"; Pearson Education.
4. Mathew Bishop; Introduction to computer Security; Addison-Wisley
5. Atul Kahate; "Cryptography

Course outcomes:

After the completion of course student will be able to:

Get the knowledge of encryption and decryption techniques and their applications in managing the security of data.

Devi Ahilya University, Indore, India				ME II Year Information Technology (Sp. Information Security) Semester- B			
Institute of Engineering & Technology							
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR2C1: Information Security Management	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

To study the methods of managing information systems in a secure way.

COURSE CONTENT

Unit I : Foundation

Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access). Threats - Viruses ,worms , Trojan horse, bombs, trap doors, spoofs, email virus, macro viruses, remedies, Intruders, Malicious software.

Unit II : Communication Security

Encryption, Public Key Infrastructure, Digital Signatures, Digital signatures.

Unit III : User Authentic Mechanisms

Passwords, Authentication tokens, Certificate based Authentication, Single Sign on (SSO), Kerberos, X.509, Cryptographic Solutions- A case study.

Unit IV : Information Security Protocols

Secure Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Secure Electronic Transaction (SET), Electronic Money, Email Security.

Unit V : System and Application Security

Intrusion detection techniques, techniques to provide privacy in Internet Application and protecting digital contents(music, vedio, software) from unintended use, authentication. IP security, Web security. file System security, program and security, memory security, Sandboxing. Security threads protection intruders- Viruses-trusted system. Firewalls, vulnerabilities & threats, Network Denial of service attack, Contract Signing, Secret Splitting.

Text and Reference books:

1. Dieter Gollman; Computer Security; John Wiley & Sons 1999
2. Mathew Bishop; Computer Security; Art and Science; Addison-Wisley Oct. 2007
3. Mathew Bishop; Introduction to computer Security; Addison-Wisley Oct 2004
4. Kaufman, Perlman and Speciner; "Network security"; Pearson Education 1995.
Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Course outcomes:

After the completion of course student will be able to:

- Understand the various security algorithm.

Devi Ahilya University, Indore, India				ME II Year Information Technology				
Institute of Engineering & Technology				(Sp. Information Security)				
				Semester- B				
Subject Code & Name		Instructions			Credits			
		Hours per Week						
ISR2C2: Digital Forensics and Security		L	T	P	L	T	P	Total
Audit								
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Course Objective:

At the completing of the course, students will be able to understand the fundamental concepts of forensic science and digital forensics principles. Learn to identify importance of digital evidence.

COURSE CONTENT

Unit I : Introduction of Digital Forensics:

Digital crime, current scenario of digital crime in India, Evidence and its role in IT Act, Digital Evidence, Digital Vs Physical Evidence, nature of Digital Evidence, precautions while dealing with Digital Evidence, challenging aspects of Digital Evidence, Digital Devices, evidential potential of digital devices, Digital Forensics, dimensions and principles of Digital Forensics, Digital Forensic Investigation, Investigation Models, Scientific method in Digital Investigation, Research potential and scope in digital forensics.

Unit II : Data and Evidence Recovery:

Seizure of digital information : Issues, methodology, factors limiting wholesale seizure, pulling the plug or not; data objects, Storage Media, Variety of data, Recovered data objects, electronic evidence: secure boot and write blockers, disk file organization ,disk and file imaging; forensic tools, forensic data carving, data recovering techniques.

Unit III : Mobile and Live Forensics Investigations:

Mobile phone forensics: mobile device characteristics, memory considerations, tools classification, flasher boxes, obstructed devices, forensics procedures: preservation, acquisition, examination and analysis, reporting; SIM Card Forensics.

Network Forensics: sources of network based evidences, procedure for applying network based forensics, digital evidence on internet, digital evidence on physical and data link layers, digital evidence at the network and transport layers.

Unit IV : Security Issues and Principles:

Risk Analysis: Terms and Definitions, Need, Methodology, Considerations and Approaches.

Security Models: IA-CMM,ISM3, SSE-CMM: Importance, Usage, Structure and Architecture, Process Areas; Security Engineering and its need.

Security Standards and frameworks: ISO 27001: Evolution, Organizational Context, ISMS Implementation in

Organizations; COBIT: Principles, Structure and Objectives.

Security Methodologies: IAM, IEM, OCTAVE, OSSTMM,SIPES.

Laws for Information Security: Introduction to The Indian IT Act, IPR, Patent law, Copyright Law.

Unit V : Security Audit/Assurance:

Security Audits : Need in Organizations, Auditor's responsibility, Types, Approaches, Technology- Based Audits :Penetration Testing and Vulnerability Scanning; Phases, Budgeting for Security Audits.
Privacy : Organizational implications, Practices ,Policy, Audits: Framework and Approach, Standards, Phases,Process : Design, Risk Analysis, Planning, Conducting, Reporting.

Text and Reference books:

- [1] Nina Godbole, Information Systems Security-Security Management, Metrics, Frameworks and Best Practices, Wiley, 2009.
- [2] Digital Forensics and Cyber Crime; Ibrahim Baggili; Springer.

Course outcomes:**After the completion of course student will be able to:**

- At the completing of the course, students will be able to understand the fundamental concepts of forensic science and digital forensics principles. Learn to identify importance of digital evidence.

Devi Ahilya University, Indore, India				ME II Year Information Technology (Sp. Information Security) Semester- B			
Institute of Engineering & Technology							
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR2C3: Secure Wireless Networks	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

- Provide students with enhance base of knowledge of wireless networking.
- Learn Security Issues in different wireless networks and mitigation techniques
- Develop a comprehensive knowledge of Tools and Techniques used in Management of wireless Networks
- Develop ability to carry out research in area of security in wireless Networks

COURSE CONTENT

Unit I : Foundation

Review of wireless communication Technologies : Cellular Networks, Wireless LAN, Prersonal Area Networks, Adhoc and Sensor Networks, Challenges in Adhoc and Sensor networks: Constrained Resources, Security, Mobility

Unit II :

Adaptability in Mobile computing, Mobility Management: Location Management Principles and Techniques, Data Dissemination and Management.

Unit III : Mobile and Wireless Security Issues, Approaches to security, Security in Wireless Personal Area Networks: Bluetooth Security Modes, Bluetooth Security Mechanisms, Authentication and Encryption in Bluetooth networks.

Unit IV :

Security in Wireless Local Area Networks: WEP, WPA, IEEE802.11i, Security in Metropolitan Area Networks: IEEE 802.16 and Security.

Unit V :

Security in Wide Area Networks: GSM Security, Four Generations of Wireless: 1G-4G, limitations and Security. Security in Ad hoc and Sensor networks.

Text and Reference books:

- [1] Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, S.K. Gupta, G. Richard
- [2] III, L. Schwiebert, Mc Graw Hill, Ed.2005.
- [3] Hacking Exposed : Mobile Secrets & Solutions, N.Bergman, M.Stanfield, J.Rose, J. Scambray.
- [4] Building Secure Wireless Networks with 802.11, Jahanzeb Khan and Anis Khwaja, Wiley 2003.
- [5] Ad Hoc Wireless Networks - Architectures and Protocols, C.Siva Ram Murthy and B.S.Manoj., Prentice Hall, 2004
- [6] Technical Papers.

Course outcomes:

After the completion of course student will be able to:

- Have enhanced base of knowledge of wireless networking.
- Learn Security Issues in different wireless networks and mitigation techniques
- Develop a comprehensive knowledge of Tools and Techniques used in Management of wireless Networks

Course outcomes:

After the completion of course student will be able to:

- Understand the various security algorithm.
- Encryption and decryption algorithm

Devi Ahilya University, Indore, India				ME II Year Information Technology			
Institute of Engineering & Technology				(Sp. Information Security)			
				Semester- B			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR2G2: Applied Cryptography	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objective:

To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Modular Arithmetic and Multiplicative Group

Modular Arithmetic for advanced cryptography, Multiplicative group of integers \mathbb{Z}_n , order of an element in \mathbb{Z}_n , generator of \mathbb{Z}_n , extended Euclidean algorithm, Pohlig-Hellman and Pollard-Rho algorithm for computing DLP, Integer factorization problems, Pollard-Rho factoring algorithm.

Unit II : Tools for Symmetric key & Public key Cryptography

Shannon ciphers and perfect security, computational ciphers and semantic security, efficient adversaries and attack

games, trapdoor function schemes, trapdoor function pair schemes, ElGamal cryptographic system, ElGamal digital signatures, fun applications.

Unit III : Block Ciphers and Their Attacks

Polynomial arithmetic, finite field $GF(2^n)$, constructing block cipher in practice, sophisticated attacks on block ciphers, case study block cipher AES: AES structure, AES transformation functions, AES key expansions, AES Implementation, fun applications.

Unit IV : Cryptanalysis, IDS and Attacks

Intrusion detection system (IDS), cross site scripting attacks, SQL injection attacks, fault injection attacks, side channel attacks, algorithmic attacks.

Unit V : Asymmetric Key Cryptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.

Text and Reference books:

- Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC
- Williams Stallings; "Cryptography & Network Security"; Pearson Education.
- Mathew Bishop; Introduction to computer Security; Addison-Wisley
- Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Course outcomes:

After the completion of course student will be able to:

- Will learn the concept of biometric methods.
- Will merge the software application with human body fetures
- Will learn the cocept of retina and figure prints association with biometric devices

Devi Ahilya University, Indore, India				ME II Year Information Technology (Sp. Information Security) Semester- B			
Institute of Engineering & Technology							
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ISR2E1: Biometric Systems & Security	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

To study the concepts of various biological based information security systems.

COURSE CONTENT

Unit I : Overview of Biometrics

Definitions, biometric modalities, course outline, Basic applications: access control, e-commerce, forensics.

Unit II : Design of a Biometric System

Building blocks, Modes of operation, Fingerprint verification: Minutiae Based Fingerprint Matching, Non-minutiae Based Representations, Fingerprint Enhancement, and Fingerprint Classification. Face Recognition:- Introduction, Authentication vs. Identification, Challenges in Face recognition, Algorithms for face recognitions. .

Unit III : Iris Recognition

Introduction, devices for capturing Iris, Iris representation schemes, Iris recognition algorithms. Biometrics based on hand geometry, signature, ear, palm, voice and DNA.

Unit IV : Multimodal Biometrics

Limitations of unimodal systems, multibiometric scenarios, levels of fusion, system design, score fusion techniques, score normalization, user-specific parameters, and soft biometrics.

Unit V : Case Study Presentations

Biometrics in Banking Industry, Biometrics in Computerized, Patient Records, Biometrics in Credit Cards, Biometrics in Mass Disaster Victim, Identification Forensic Odontology

Text and Reference books:

- [1] D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar; "Handbook of Fingerprint Recognition"; Springer Verlag, 2003.
- [2] A.K. Jain, R. Bolle, S. Pankanti (Eds.); "BIOMETRICS: Personal Identification in Networked Society", Kluwer Academic Publishers, 1999.
- [3] J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.); Biometric Systems: Technology, "Design and

Course outcomes:

After the completion of course student will be able to:

- Will learn the concept of biometric methods.
- Will merge the software application with human body fetures
- Will learn the cocept of retina and figure prints association with biometric devices

M. E. Electronics (Specialization in Digital Instrumentation)

(FULL TIME) Curriculum & Syllabus

S. No.	Category	No. of Credits			
		SEM I	SEM II	SEM III	SEM IV
1.	Course Compulsory	15	15	-	-
2.	Generic Elective	4	4	-	-
3.	Programme Elective	5	5	-	-
4.	Skill development	2	2	-	-
5.	Seminar/ Workshop	2	2	-	-
6.	Dissertation Phase	-	-	12	12
Actual Credits per Semester		28	28	12	12
Total actual Programme Credits					80
7.	Virtual Credit Comprehensive Viva	4	4	4	4
Total Credits per Semester		32	32	16	16
Total (Actual + Virtual) Credits					96

M.E Electronics (Specialization in Digital Instrumentation)**(Full Time) Proposed Scheme for CBCS**

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-I	Sub Type
1.	DIR1C1	Industrial Transducers & Smart Sensors	3-1-1	PC1
2.	DIR1C2	Embedded System using ARM Micro controller	3-1-1	PC2
3.	DIR1C3	Modern Control Systems	3-1-1	PC3
4.	DIR1GX	Generic Elective I	3-1-0	GE1
5.	DIR1EX	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	DIR1W1	Seminar / Workshop / Research Tool	0-2-0	
8.	DIR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
		List of Generic Elective I		
1.	DIR1G1	Advance System Design	3-1-0	
2.	DIR1G2	Wireless Sensor Network	3-1-0	
3.	DIR1G3	Advanced Communication Networks	3-1-0	
4.	DIR1G4	Medical Instrumentation	3-1-0	
		List of Elective I		
1.	DIR1E1	Fuzzy Logic & Neural Network	3-1-1	
2.	DIR1E2	Object Oriented Programming	3-1-1	
3.	DIR1E3	Nano Devices and Nano sensors	3-1-1	
4.	DIR1E4	Advance Digital Signal Processing	3-1-1	
SEM II				
1.	DIR2C1	Digital Image Processing	3-1-1	PC4
2.	DIR2C2	Process Instrumentation & Industrial Control	3-1-1	PC5
3.	DIR2C3	System Design Using Verilog	3-1-1	PC6
4.	DIR2GX	Generic Elective II	3-1-0	GE2
5.	DIR2EX	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	DIR2W2	Seminar / Workshop / Research Tools	0-2-0	
8.	DIR2V2	Comprehensive Viva I	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
		List of Generic Elective II		
1.	DIR2G1	Software Engineering	3-1-0	
2.	DIR2G2	Embedded RTOS	3-1-0	
3.	DIR2G3	Modeling and Simulation	3-1-0	
4.	DIR2G4	Industrial Communication	3-1-0	
		List of Elective II		
1.	DIR2E1	Analog and Digital VLSI Circuit Design	3-1-1	
2.	DIR2E2	Analytical Instrumentation	3-1-1	
3.	DIR2E3	Optical and Laser Instrumentation	3-1-1	
4.	DIR2E4	Advanced Industrial Drives and Control	3-1-1	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. DigitalInstrumentation) Semester-			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR1C1: Industrial Transducers and smart Sensors	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

Acquire the knowledge of basic principles of sensing various parameters. Learn comparative methods of selection of sensors for typical applications

COURSE CONTENT

Unit I

Temperature Measurement: Classification of temperature sensors, working principle, types, materials, Non electrical sensors (thermometer, thermostat), electrical sensors (RTD, thermocouple, thermistors), radiation sensors (pyrometers), temperature switch.

Pressure Measurement: Definition, working principle, types, materials, manometers, elastic pressure sensors, secondary pressure sensors, differential pressure sensors, force balance type, motion balance type, capacitive (delta cell), ring balance, vibrating cylinder type, high-pressure sensors, low-pressure sensors, pressure switch.

Unit II

Level Measurement: Working principle, types, materials, float, displacers, bubbler, and DP- cell, ultrasonic, capacitive, microwave, radar, radioactive type, laser type transducers, level gages, resistance, thermal, TDR/ PDS type, solid level detectors, fiber optic level detectors, level switch.

Flow Measurement: Working principle, types, materials, primary or quantity meters (positive displacement flow meter), secondary or rate meter (obstruction type, variable area type), electrical flow sensors (turbine type, electromagnetic type, and ultrasonic type), Flow switch.

Unit III

Force and Torque Measurement: Basic methods of force measurement, elastic force traducers, strain gauge, load cells, shear web, piezoelectric force transducers, vibrating wire force transducers, strain gauge torque meter, Inductive torque meter, magneto-strictive transducers, torsion bar dynamometer, etc. Dynamometer (servo control and absorption) instantaneous power measurement and alternator power measurement.

Unit IV

Allied Sensors: Standards, working principle, types, materials, design criterion: LLeak detector, flame detector, smoke detector, humidity, density, viscosity sensors, and digital transducers, sound sensors, and proximity sensors. **Advanced sensors:** Working Principle, types, materials: Smart sensors, MEMS, nano sensors IC sensors, optical fiber sensors.

Unit V

Industrial Communication Systems: Introduction to interface, fieldbus, PROFIBUS-PA, foundation fieldbus.

Text and Reference books:

- [1] B. C. Nakra and K. K. Choudhari, "Instrumentation Measurements and Analysis", Tata McGraw Hill Education, Second ed., 2004.
- [2] Sabrie Soloman, "Sensors Handbook", McGraw Hill Publication, First ed., 1998.
- [3] A. K. Sawhney, "Electrical & Electronic Instruments & Measurement", Dhanpat Rai and Sons, Eleventh ed., 2000.
- [4] Dr. D. S. Kumar, "Mechanical Measurements and Control", 3/e, Reprint-2004, Metropolitan Book Co. Private Ltd., 2004.
- [5] B. E. Noltingk, "Instrumentation Reference Book", 2nd Edition, Butterworth Heinemann, 1995.
- [6] B. G. Liptak, "Process software and digital networks", 3rd Edition, CRC press, Florida.

Course Outcomes:

After the completion of Course student will be able to:

- They can perform the analysis on pressure measurement and temperature measurement.
- They can make industry oriented research on the various topics covered in the various topics

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR1C2: Embedded System using ARM Microcontroller	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller- based embedded systems. High-level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects.

Prerequisite: Knowledge of Microprocessor and C++ Programming

COURSE CONTENTS

Unit I

Introduction: Definition of embedded system, embedded systems vs general computing systems, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, core of the embedded system: general purpose and domain specific processors, embedded system architecture: RISC and CISC, RISC: Introduction of ARM processors, evolution of ARM, ARM design philosophy, ARM processor fundamentals: data flow model, registers, program status register, pipeline, interrupts and vector table, ARM processor families and nomenclature.

Unit II

ARM Basic Instruction Set: Introduction to 32 bit programming, instruction set, architecture of ARM, addressing modes, data processing instructions, branch instructions, load and store instructions, conditional instructions, PSR instructions, stack instructions.

Unit III

ARM Thumb Instruction Set: Overview, branch instructions, data processing instructions, status register access instructions, single register load and store instructions, multiple register load and store instructions, semaphore instructions, coprocessor instructions, stack instructions, interrupt instructions.

UNIT IV

ARM Programming: Assembly language programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, register allocation, conditional execution and loops. C programming for ARM: Simple C program using function, pointers, structures, etc, exception handling, interrupts, interrupt handling schemes.

Unit V

Interfacing and Applications: Programs for LCD display, PWM, ADC, DAC application, measurement and control of physical parameter as temperature, stepper motor control, DC motor control etc.

Text and Reference Books:

- [1] Andrew N. Sloss, "ARM System Developer's Guide Designing and Optimizing System Software", Elsevier publication, 2004.
- [2] Par Furber, "Arm System-On-Chip Architecture", 2/E, Pearson Education Limited, 2000.
- [3] Par Santanu Chattopadhyay, "EMBEDDED SYSTEM DESIGN", PHI Learning Private Ltd., 2013.
- [4] Jonathan W. Valvano, "Embedded Microcomputer Systems, Real Time Interfacing, Brookes /Cole, 1999, Thomas Learning.

Course Outcomes:

After the completion of Course student will be able to:

- They can perform the analysis on different types of application development process like LCD display etc.
- They can make industry oriented research on the various topics with the help of Assembly language programming and other technology used in the syllabus.
- Well understanding of architecture of ARM will be developed that will be help full in future.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR1C3: Modern Control Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Course Objective: The objective is to give students a clear understanding on characteristics of digital control systems from both frequency and time domain viewpoints. Also to give students the basic knowledge of nonlinear, optimal and adaptive control systems.

Prerequisite: Knowledge of classical control methods, Z-transform, mapping of s-plane to z-plane, & MATLAB control system toolbox

COURSE CONTENTS

Unit I

Data conversion & quantization, Sampling process, mathematical analysis of sampling process, Reconstruction of sampled signal, zero order, first order hold pulse transfer function, Block diagram reduction for systems interconnected through samplers, Sampled Signal flow graphs, Stability definition, Jury's test of stability, extension of Routh-Hurwitz criterion to discrete time systems, steady state error analysis.

Unit II

Root Loci, Frequency domain analysis, Bode plots, Nyquist plots, Gain margin & phase margin, Digital implementation of analog controllers: Digital controller Design: Classical methods, digital PID's, digital lead- lags, dead-beat controller.

Unit III

State space representation of discrete time systems, Solution of state equation, Pulse transfer function from state equation, Response between sampling instant using state model, observability, controllability, useful transformation in state space, pole placement methods, controller implementations, State observers.

Unit IV

Non Linear Control Design: Introduction, General properties of linear and nonlinear systems, describing function analysis: Definition, limitations, use of describing function for stability analysis, describing function of ideal relay, relay with hysteresis, dead zone, saturation, coulomb friction and backlash, Phase Plane Analysis, phase portrait of second order nonlinear systems, limit cycle, Equilibrium finding, Stability of Nonlinear Systems: Liapunov Theorems, An Overview of Kalman Filter Theory.

Unit V

Adaptive control: Model reference control. Identification, convergence and stability. Adaptive control of linear systems via state feedback and via output feedback. Adaptive control of nonlinear systems.

Optimal Control Design : Quadratic Optimal Control and Quadratic performance index, Optimal state regulator through the matrix riccati equations, Steady State Quadratic Optimal Control, Calculus of Variations: An Overview, Optimal Control formulation using Calculus of Variations, Classical Numerical Methods for Optimal Control, Linear Quadratic Regulator (LQR) Design – I, Linear Quadratic Regulator (LQR) Design – II

Text and Reference Books:

- [1] Kuo, Digital Control System, 2/e Oxford Press, 1992.
- [2] Ogata, Discrete – Time Control System, 2/e PHI, 1995.
- [3] M Gopal, Digital Control System, TMH, 1997.
- [4] H. K. Khalil, Nonlinear Systems, 3/e, Prentice Hall, 2002.
- [5] Jasbir Arora, Introduction to Optimum Design, third edition, Elsevier. 2003
- [6] N Andreasson , A Evgrafov , M Patriksson , An Introduction to Continuous Optimization, Overseas Press,

Course Outcomes:

After the completion of Course student will be able to:

- They can perform the analysis on different types of application based on the optimal control design pattern ..
- They can make industry oriented research that will be helpful in making future required
- with the help of programming and other technology used in the syllabus.
- Well understanding of Frequency domain analysis will be developed that will be help full in future development of the application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIR1G1: Advance System Design		L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Course Objective:

To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite:

Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit I

Introduction to digital IC design – full Custom and semi-custom design flow and comparison, Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit II

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional Unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design- Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit III

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit IV

Subsystem design principles pipelining - Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model- Technology scaling effect on interconnect and - Noise in interconnects.

Unit V

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

Text and Reference Books:

- [1] John M Yarbrough, “Digital Logic Applications and Design”, Thomson learning
- [2] Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata Mc Graw Hill Edition
- [3] Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005.
- [4] Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer,Third edition,1999.

Course Outcomes:

After the completion of Course student will be able to:

- FPGA Programming technologies will be help full in research and development as per the industry requirement.

- They will perform the high level synthesis on different types of application like Scheduling and allocation- ASAP and ALAP etc.
- They can make industry oriented research that will be helpful in making future required products with the help of programming and other technology used in the syllabus.
- Well understanding of subsystem design principles will be developed that will be help full in development of the application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIR1G2: Wireless Sensor Networks		L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Course Objectives: To list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks, and propose, implement, and evaluate new ideas for solving wireless sensor network design issues.

Prerequisite(s): Computer Networks

COURSE CONTENTS

Unit I

Introduction and Overview of Wireless Sensor Networks: Introduction, Brief Historical Survey of Sensor Networks, and Background of Sensor Network Technology, AdHoc Networks, Applications of Wireless Sensor Networks: Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology, Basic Sensor Network Architectural Elements, Home Control, Medical Applications, Basic Wireless Sensor Technology : Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Network Standards: IEEE 802.15.4, ZigBee, IEEE 1451

Unit II

Medium Access Control Protocols for Wireless Sensor Networks: Introduction, Background, Fundamentals of MAC Protocols, MAC Protocols for WSNs: Schedule-Based Protocols, Random Access-Based Protocols, Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange (B-MAC, Box-MAC, Bit-MAC, H-MAC, I-MAC, O-MAC, S-MAC, Ri-MAC, T-MAC, Q-MAC (Query MAC), Q-MAC (QoS MAC), X-MAC

Unit III

Routing Protocols for Wireless Sensor Networks: Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing

Unit IV

Transport Control Protocols and Middle wares for Wireless Sensor Networks: Traditional Transport Control Protocols: TCP (RFC 793), UDP (RFC 768), MobileIP, Introduction, WSN Middleware Principles, Middleware Architecture: Existing Middleware: MiLAN (Middleware Linking Applications and Networks), IrisNet (Internet-Scale Resource-Intensive Sensor Networks Services)

Unit V

Operating Systems for Wireless Sensor Networks: Introduction, Examples of Operating Systems: TinyOS, Mate, MagnetOS

Text and Reference Books:

- [1] Wireless Sensor Network by Kazem Sohraby, Daniel Minoli, Taieb Znati Pub: Wiley.
- [2] Wireless Sensor Networks Signal Processing and Communications by Ananthram Swami, Qing Zhao, Yao- Win Hong, Lang Tong Pub: John Wiley & Sons.
- [3] Ad Hoc Wireless Networks: Architectures And Protocols By Murthy Pub: Pearson Education

[4] Wireless sensor networks Edited by C. S. Raghavendra Pub: Springer

[5] Fundamentals of Sensor Network Programming: Applications and Technology By Sridhar S.Iyengar, NandanParameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D. Okoye, Wiley

Course Outcomes:

After the completion of Course student will be able to:

- Deep study of wireless Sensor Networks technologies will be help full in research and development as per the industry requirement.
- Student will have deep knowledge of Medium Access Control Protocols for Wireless Sensor Networks protocol as per the research and analysis requirement.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIR1G3: Advanced Communication Networks		L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

COURSE CONTENTS

Unit I

Fundamentals of communication Networks: Basics of optical communication and computer networking: services, switching, multiplexing schemes, telecom network overview and architecture, optical networks, WDM optical networks, WDM network evolution, WDM network construction, broadcast and select optical WDM network, Challenges of optical WDM network.

Unit II

Optical network Components: Optical transmitters, semiconductor laser diode, tunable and fixed laser, laser characteristics, photodectors, tunable and fixed optical filters, optical amplifiers and its characteristics, semiconductor laser amplifier, Raman amplifier, doped fiber amplifier, various switching elements, OADM, OXC, architecture, MEMS, wavelength convertors, Couplers, isolators, circulators, optical line terminals, all optical cross connect configurations.

Unit III

Optical network architecture: Synchronous optical network/ synchronous digital heirarchy-elements, multiplexing, layers, SONET physical layer, frame structure, WDM network architectures, QoS parameters for optical networks, wavelength routed networks, routing and wavelength assignment (RWA), optical multicast routing, access networks.

Unit IV

Wavelength routing and Survivability: Classification of RWA algorithms, Problem formulation, routing sub- problem: fixed routing, fixed alternate routing, adaptive routing, fault tolerant routing, wavelength assignment sub-problem, wavelength reuse and conversion criterions, algorithms: flow deviation algorithm, fairness and admission control, restoration schemes, multiplexing schemes, provisioning restorable single fiber networks.

Unit V

Wireless adhoc networks: Introduction to ad-hoc networks, MAC Protocols for ad hoc networks, routing protocols, Transport layer, Cross layer design for ad hoc networks. Wireless sensor networks (WSN), MAC protocol for WSN, routing protocol, data management and security, applications

Text and Reference Books:

- [1] Optical networks – Apractical prespective : Rajiv Ramaswami and K N Sivarajan, Morgan Kaufmann Publishers, 2002.
- [2] WDM optical Networks: Concepts, Design and algorithms , C. Siva Ram Murthy and Mohan Gurusamy, PHI, 2011.
- [3] Mukherjee, B- Optical communication networks”, Mc-Graw Hill, New York,1997.
- [4] C. Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education, 2007.
- [5] C.S.Raghavendra Krishna, M.Sivalingam and Tarib znati, “Wireless Sensor Networks”, Springer publication, 2004.

Course Outcomes:

After the completion of course student will be able to:

- Well understanding of the concept of Basics of optical communication and computer networking for research and analysis will be developed.
- Application development using Optical network Components like Optical transmitters, semiconductor laser diode etc will be developed
- Concept of Wavelength routing and Survivability help in research and analysis.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR1G4: Medical Instrumentation	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objective: To understand the advanced biomedical instruments used in hospitals. To review the basic concept of medical Imaging systems. To understand the concept of various biomedical instruments and technologies.

COURSE CONTENT

Unit I

Basic Medical Instrumentation system, General Constraints in design of medical instrumentation system, Patient Safety, Automated Drug Delivery Systems, Blood and its composition and function, Blood Cell Counters, Pulse Oximetry, Introduction to telemetry & Telemedicine .

Unit II

X-ray machines, Dental X-ray machines, Digital Radiography, Principles and, System components of Tomography, Principles of NMR, its components and biological effects. Ultrasonic & Thermal imaging systems. CT Scanning, basic CT scanning system, Types of gantries, image reconstruction techniques in tomography, image artefacts, EEG and ECG

Unit III

Pacemaker – general description and instrumentation details, Types of pacemakers: External & Internal, Defibrillators: AC & DC Defibrillator, Heart Lung Machine. Diathermy: Electro surgical diathermy (ESU), Short wave, Microwave. Artificial Kidney, Dialyzers, Haemodialysis machine. Stone disease problem, lithotripter systems, Anesthesia machine, Mechanism of artificial ventilation, Types of Ventilator

Unit IV

Interaction of Lasers with Tissues -Thermal and Non thermal, Basic Endoscopes system & its characteristics, Laser Applications in ophthalmology- Diabetic Retinopathy , Glaucoma and Retinal hole and detachment treatment , Dermatology- Tattoo, port wine treatment.

Unit V

Orthotics & Prosthetic devices, overview of various orthotics & prosthetic devices along with its materials. Wheelchair Types, Materials used in wheelchair.

Text and Reference Books:

- [1] Medicine and Clinical Engineering By Jacobsons & Webster, PHI
- [2] Introduction to Biomedical Equipment Technology By Carr & Brown
- [3] Biomedical Instrumentation and Measurements By Cromwell, PHI
- [4] Handbook of Biomedical Instrumentation By R. S. Khandpur, TMH
- [5] The Biomedical Engineering Handbook, Bronzino, IEEE Press
- [6] Applied Chemical Engineering Feenberg,
- [7] Principles of Medical Imaging.-By: K. Kirk Shung, Michael B. Smith, Benjamin Tsui.-Pub: Academic Press.
- [8] Medical Laser Applications -By Carruth
- [9] Medical Lasers & their safe Use By Sliney & Trokal

Course Outcomes:

After the completion of course student will be able to:

- Well understanding of the concept of advanced biomedical instruments used in different industries.
- Knowledge development of Interaction of Lasers with Tissues will provide a base for research in field of cancer fighting equipment's.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR1E1:Fuzzy Logic and Neural Network	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENT

Unit I

Introduction to Neural Networks: Mathematical models of a Neuron, Network Architectures, Perceptron and MLP, Back-Propagation Algorithm, Characterizing Neural Network Architectures, Learning in Artificial Neural Networks; Supervised, Unsupervised and Competitive Learning paradigms; Learning rules and Functions, Hebbian Learning, Associative Memories, Self Organizing Maps, Computing with Artificial Neural Networks, Applications of Artificial Neural Networks, RBF and RCE neural networks LVQ, Solving optimization problems using neural networks. Stochastic neural networks, Boltzmann machine

Unit II

Fuzzy sets, fuzzy logic and fuzzy inference, Rough sets.

Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions. Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations. Propositional logic and Predicate logic, fuzzy If – Then rules, fuzzy mapping rules and fuzzy implication functions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic

Unit III

Fuzzy neural networks Integration of fuzzy logic and neural networks, Fuzzy Hybrid neural, Computation of fuzzy logic inferences by hybrid neural net, Tuning fuzzy control parameters by neural nets, Fuzzy rule extraction from numerical data, Neuro-fuzzy classifiers, ANFIS, Applications of fuzzy neural systems, MATLAB based problems

Unit IV

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional method

Unit V

Fuzzy controllers, Fuzzification and Defuzzification Methods , Fuzzy Inference Techniques, Computer vision, applications of fuzzy logic in pattern recognition and image processing. Applications of Neural networks in pattern recognition problems

Text Books and References

- [1] G J Klir and B Yuan, "Fuzzy Sets and Fuzzy Logic - Theory and Applications", Prentice-Hall, 1995.
- [2] Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and applications by S. Rajsekharan, Vijayalaxmi Pai
- [3] C. Bishop, "Neural Networks for Pattern Recognition", Oxford University Press, 1995.
- [4] D. Driankov, H. Hellendoorn and M Reinfrank, "An introduction to fuzzy control", Springer-Verlag, 1993
- [5] S. Haykin, "Neural Networks: A Comprehensive Foundation", Prentice Hall, 1999

Course Outcomes:

After the completion of course student will be able to:

- Pattern identification and image pattern learning skills development.
- Speech and language processing can be more optimized after learning this course.
- Image based classification can be done in various fields for optimized results.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR1E2:Object Oriented Programming	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: The aim of the course is to give a thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking.

Prerequisite(s): Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C.

COURSE CONTENTS

Unit I

Introduction: The History of Java, Java's Key Features, The Java Virtual Machine, The First Application. Basic Syntax - Identifiers, Comments, Keywords, The Eight Primitives, Using Objects. Expression and Arrays : Using Operators, The 'If-Else' Statements, Using 'While' Loop, Selecting with 'Switch' statement, Dealing with Primitive Casts. Using Arrays - Creating an Array, Array Initialization, Working with Arrays, Using Multi- dimensional Arrays. Classpath&JARs: The 'Classpath' in Java, Java Archives.

Unit II

Classes: Classes & Packages, The 'import' Statement, The Importance of Encapsulation, Java Constructors, Access Modifiers (private, default and public), Method Overloading. Polymorphism and Inheritance: The 'Protected' Modifier, Using 'this' and 'super', The 'final' keyword, Static Members & Methods. Interfaces & Abstract Classes, The Complete Construction Process, The Class 'Object', Nested Classes, Enums in Java.

Unit III

Basic Design Patterns:

Basic Concepts of Design Patterns, Iterators, The Pattern Concept, The OBSERVER Pattern, Layout Managers and the STRATEGY Pattern, components, Containers, and the COMPOSITE Pattern, Scroll Bars and the DECORATOR Pattern. The Java Object Model: The Java Type System, Type Inquiry, the Object Class, Shallow and Deep Copy, Serialization, Reflection

Unit IV

Exception, Collections and IO

Exceptions & Assertions: Types of Program Errors, The Exception Model, Checked and Unchecked Exceptions, Defining Custom Exceptions, Assertions. Working with Common Classes: java.lang.String, java.lang.System, java.util.Calendar. The Java Collection Framework & Generics: List Basics, Using Lists Wisely, Other Collection Classes. Java IO: Input Stream/Output Stream, JavaSerialization, Readers & Writers, Working with Files.

Unit V

Thread and Applet

Threads: The Java Thread Model, Thread Priorities, Synchronization, Messaging, Thread Class, Runnable Interface. Applet Architecture – Skeleton- Simple Applet Display Methods- HTML APPLET tag – Passing Parameters to the Applet- AudioClip and AppletStub Interface - Delegation Event Model – Event Classes. Networking: Overview, TCP/IP Sockets, Writing Your Own Web Server.

Text Books and References:

- [1] Herbert Schildt, "Java The Complete Reference", Eighth Edition, Tata McGraw-Hill Edition India, 2011.
- [2] Cay Horstmann, "Object Oriented Design & Patterns", John Wiley & Sons, 2004.
- [3] Bruce Eckel, "Thinking in Java", 4th edition, Pearson Education, 2006.
- [4] Ramesh Vasappanavara et al, "Object-oriented Programming Using C++ and Java", First Impression, Pearson, 2011.
- [5] Cay Horstmann, "Big Java 4e for Java 7 and 8", John Wiley & Sons, 2010.

Course Outcomes:**After the completion of course student will be able to:**

- Develop live projects which will help in their research work.
- Various IOT based application are developed by students in order to make ease of doing.

0Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR1E3:Nanodevices& Nanosensors	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: this course will focus on understanding of the basic structure principals of Nano-devices and sensors.

Prerequisite(s): Introduce the quantum mechanical concepts needed to understand the operation

COURSE CONTENTS

Unit I

Quantum Devices: Quantum Electronic devices – Electrons in mesoscopic structures – Short channel, MOS Transistor – split Gate Transistor – Electron wave transistor – Electron spin transistor – Quantum Dot array – Quantum computer- Bit and Qubit. Carbon Nanotube based logic gates, optical devices. . Connection with quantum dots, quantum wires, and quantum wells

Unit II

Tunneling Devices: Tunnelling element – Tunnel Effect and Tunneling Elements-Tunnelling Diode – Resonant Tunnelling Diode – Three -Terminal Resonate Tunnelling Devices-Technology of RTD-Digital circuits design based on RTDs - Basics Logic Circuits – Single Electron Transistor(SET) – Principle – Coulomb Blockade- Performance – Technology- Circuit Design- Logic and Memory Circuits – SET adder as an Example of a Distributed Circuit.

Unit III

Nanosensors I: Micro and nano-sensors, Fundamentals of sensors, biosensor, micro fluids, Packaging and characterization of sensors, Method of packaging at zero level, dye level and first level. Sensors for aerospace and defense: Accelerometer, Pressure Sensor, Night Vision System, Nano tweezers, nano-cutting tools, Integration of sensor with actuators and electronic circuitry,

Unit IV

Nanosensors II: Sensor for bio-medical applications: Cardiology, Neurology and as diagnostic tool, For other civil applications: metrology, bridges etc. Biosensors. Clinical Diagnostics, generation of biosensors, immobilization, characteristics, applications, conducting Polymer based sensor, DNA Biosensors, optical sensors. Biochips. Metal Insulator Semiconductor devices, molecular electronics, information storage, molecular switching, Schottky devices,

Unit V

NEMS: Inertial sensors – accelerometer – gyroscope - micromechanical pressure sensors – pizoresistive – capacitive - microrobotics – micro channel heat sinks – optical MEMS – visual display – precision optical platform – optical data switching – RF MEMS – MEMS variable capacitors – MEMS switches – Resonators.

Test Books and Reference Books:

- [1] K. Goser, P. Glosekotter and J. Dienstuhl, “Nanoelectronics and Nanosystems-From Transistors to Molecular Quantum Devices” , Springer, 2004.
- [2] HerveRigneault, Jean-Michel Lourtioz, Claude Delalande, Ariel Levenson, “Nanophotonics”, ISTE.
- [3] W.R.Fahrner, “Nanotechnology and Nanoelectronics – Materials, Devices and Measurement Techniques”Springer, 2006 13
- [4] Sensors: Micro &Nanosensors, Sensor Market trends (Part 1&2) by H. Meixner.
- [5] Nanoscience& Technology: Novel structure and phenomena by Ping Sheng (Editor)
- [6] Nano Engineering in Science &Technology : An introduction to the world of nano design by Michael Rieth.

- [7] Tai –Ran Hsu, “MEMS & Microsystems Design and Manufacture”, Tata McGraw-Hill publication, 2001.
[8] P. Rai-Choudhury, “MEMS and MOEMS technology and applications”, PHI learning private Ltd, 2009.
[9] Mohamed Gad-el-Hak, “The MEMS Handbook”, CRC Press, 2002.

Course Outcomes:

After the completion of course student will be able to:

- Learning of Quantum Devices will provide a base for research work.
- Various IOT based application are developed by students using the concepts of various sensors

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week		Credit s				
DIR1E4: Advance Digital Signal Processing		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s): A basic course in Digital signal processing.

COURSE CONTENTS

Unit I

Overview of DSP, FIR filters, IIR filters, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, Linear prediction & optimum linear filters stationary random process, forward- backward filters linear prediction, solution of normal equation.

Unit II

Multi rate DSP, Sampling rate conversion, poly phase filters, multistage decimator & interpolator, QMF, digital filter banks, DFT in spectral estimation, Adaptive filters & spectral estimation.

Unit III

Minimum mean square criterion, LMS algorithm, Recursive least square algorithm, Application of DSP & Multi rate DSP Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications.

Unit IV

Image representation: Gray scale and color images, image sampling and quantization. Image enhancement: Filter in spatial and frequency domains, histogram based processing and homomorphic filtering. Edge Detection edge linking, boundary descriptors. Image Segmentation: Thresholding, region based segmentation Image Compression: lossy and lossless compression techniques.

Unit V

Entropy coding, lossy and lossless predictive coding, uniform and non uniform quantizers, transform based compression, JPEG, Image reconstruction from projections: Principles, mathematical basis of tomography. Projections, The Fourier Slice Theorem, Reconstruction Algorithms for Parallel Projections, Three dimensional projections. Computer visualization of 3D data: Rendering techniques: Surface based and volume based techniques. Direct Volume rendering: Ray casting, opacity function. Maximum Intensity Projection

Text and Reference Books:

- [1] Gonzalez and Woods :Digital Image Processing, Pearson Education 3rd Edition
- [2] A.K.Jain : Fundamentals of Digital image processing, PHI

Course Outcomes:

After the completion of course student will be able to:

- Various speech and language processing enhancement will be done and research will be more refined.
- Three dimension projection process can be optimized by learning three dimension projection
- and many more research can be performed using the same concept.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2C1: Digital Image Processing	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CINTENTS

Unit I

Introduction: Background, Digital Image Representation, Elements of a Digital Image Processing System. Data Acquisition Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, machband effect, Color image fundamentals RGB, HSI models, Image sampling, Quantization, dither.

Image Transforms: Geometric and spatial transforms Introduction to the Fourier Transform, The Discrete Fourier Transform, Properties of the Two-Dimensional Fourier Transform, Other Separable Image Transforms. **Unit II**

Morphological Image Processing: Dilation and Erosion, Labelling connected components, Morphological reconstruction, Gray-scale morphology, Image descriptors: Region and boundary extraction, Image representation: Chain code, boundary, skeletons, signature descriptors: shape numbers, Fourier descriptors, statistical moments, corner, Regional descriptors, PCA

Unit III

Image Enhancement and segmentation: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Low-pass Filtering, High-pass Filtering, Generation of Spatial Masks from Frequency Domain Specifications. point, line, Edge detection, line detection using Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds.

Unit IV

Image Restoring: Degradations Model - Definitions, Noise Models, Diagonalization of Circulant and Block- Circulant Matrices, Circulant Matrices, Block Circulant Matrices, Effects of Diagonalization on the Degradation Model, Restoration approach, Unconstrained Restoration, Constrained Restoration, Inverse Filtering – Formulation, Removal of Blur Caused by Uniform Linear Motion, Restoration in the Spatial Domain, Geometric Transformation.

Unit V

Image Compression: Fundamentals, Types of Redundancy, Fidelity Criteria. Image Compression Models, The Source Encoder and Decoder, The Channel Encoder and Decoder. Elements of Information Theory Error-Free Compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression, Lossy Predictive Coding, Transform Coding.

Text and Reference Books:

- [1] Rafael. C. Gonzalez & Richard E.Woods.- Digital Image Processing, 2/e Pearson Education, New Delhi - 2006
- [2] W.K.Pratt.-Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006
- [3] A.K. Jain-Fundamentals of Digital Image processing- PHI, New Delhi(1995)
- [4] M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition, 2007.

Course Outcomes:

After the completion of course student will be able to:

- Various Image Enhancement and segmentation algorithm will help students in developing the applications which will help in different organization mainly working on the concept of image inputs.
Image Compression technique provides a way by which image size can be reduce and optimized.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester-B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2C2: Process Instrumentation and Industrial Control	L	T	P	L	T	P	Total
Duration of paper: 3 Hours	3	1	2	3	1	1	5

Course Objective: To enable students to understand the basic concept of process instrumentation applicable in various industries. It will also give in depth knowledge regarding different type of control strategies instrumentation and controller used in processing industries.

COURSE CONTENT

Unit I

Fundamentals of Process Control

Elements of process control loop, concept of process variables, set point, controlled variable, manipulated variable, load variable. Need for standardization of signals, current, voltage and pneumatic signal standards, concept of live & dead zero, Difference between converter & transmitter, Pneumatic to current converter, Current to pneumatic converter .

Unit II

Types of Control Actions:

Discontinuous: ON/OFF, Continuous: Proportional, integral, derivative, proportional-Integral, Proportional- Derivative, Proportional-Derivative-Integral

Tuning of Controller:

Quarter Amplitude Decay Ratio, Loop disturbance, optimum control, Measure of quality, stability criteria, Tuning methods: Process Reaction Curve (open loop), Ziegler Nichols (closed loop), set point tuning Vs load disturbance tuning.

Unit III

Programmable Logic Controller (PLC):

Continuous versus Discrete Process Control, ladder diagram using standard symbols, Architecture of PLC, PLC ladder diagram and instructions, PLC Programming for process applications.

Complex Control Systems:

Introduction, cascade, feed forward, Ratio Control, Anti Reset, Selector & Multivariable control scanners.

Unit IV Control Valve:

Classification of control valves based on: Valve body. Construction, type of actuation, application etc. Control valve terminology: Range ability, turndown, valve capacity, Air to open, Air to close, valve gain etc. Control valve characteristics: Inherent & installed Control valve accessories. Types of actuators. Positioners: Application/Need, Types, Effect on performance of control valves.

Unit V

Safety and Hazards:

Explosion Proof Housing, Encapsulation, Sealing, & Immersion, intrinsic safety, Concept of safety cycle.

DCS and SCADA:

DCS architecture, system elements of DCS. Definition of SCADA, Application area of SCADA, Major elements of SCADA, Advantages and disadvantages of SCADA, Comparison of SCADA, DCS, PLC and Smart Instrumentation.

Text Books and References:

- [1] Curtis Johnson, "Process Control and Instrumentation Technology", Prentice-Hall of India Seventh ed., 2005.
- [2] B. G. Liptak, "Process Control, Instrument Engineering Hand book", Chilton Book Company, Third ed., 1995

Course Outcomes:

After the completion of course student will be able to:

- Develop more results using Research work based on Complex Control Systems

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2C3: System Design using Verilog	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives:

To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog. Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s):

Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

Unit I

Overview of Digital Design with Verilog HDL: Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts: Lexical conventions, data types, system tasks, compiler directives.

Unit II

Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling: Modeling using basic Verilog gate primitives, description of andlor and buflnotype gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling: Continuous assignments, delay specification, expressions, operators, operands, operator types.

Unit III

Behavioral Modeling: Structured procedures, initial and always, blocking and no blocking statements, delay control, event control, conditional statements, multiday branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation.

Useful Modeling Techniques: Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

Unit IV

Timing and Delays: Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling: MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

Unit-V

Logic Synthesis with Verilog HDL: Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

Text Books and References:

- [1] Samir Palnitkar , "Verilog HDL-A guige to Digital Design and Synthesis " 2nd Edition, Pearson , 2006.
- [2] J. Bhaskar, "A Verilog HDL Primer", B.S Publications,

Course Outcomes:

After the completion of course student will be able to:

- More understanding of Evolution of CAD will be developed which will make the development process of the models easy.
- Power consumption can be optimized by learning the concept of MOS and CMOS switches, bidirectional switches etc.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B				
Subject Code & Name		Instructions Hours per Week		Credit s				
DIR2G1: Software Engineering		L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Course Objectives: The main purpose of this course is to impart knowledge on the basic principles of software development life cycle.

Prerequisites: Knowledge of Basic Data Types - Lists, Stacks, Queues, Hash Tables ,Trees - Binary Trees, Tree Traversal, Memory Management - Storage Allocation, Garbage Collection, Algorithms - Divide and Conquer, Backtracking, Iterative Techniques, Searching and Sorting, Complexity - O-Notation

COURSE CONTENTS

Unit I - Introduction

Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process-Agile development-Agile Process- Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity.

Unit II-Requirements

Requirements Engineering-Establishing the Groundwork-Eliciting Requirements- Developing use cases- Building the requirements model-Negotiating, validating Requirements-Requirements Analysis-Requirements Modeling Strategies.

Unit III-Design modeling with UML

Modeling Concepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams - Diagram Organization- Diagram Extensions. Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements .

Unit IV-Software implementation

Structured coding Techniques-Coding Styles-Standards and Guidelines- Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism.

Unit V-Testing and Maintenance

Testing: Software Quality- Software Quality Dilemma- Achieving Software Quality- Testing: Strategic Approach to software Testing- Strategic Issues- Testing: Strategies for Conventional Software, Object oriented software, Web Apps-Validating Testing- System Testing- Art of Debugging.

Maintenance: Software Maintenance-Software Supportability- Reengineering- Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering

Text and Reference Books:

- [1] Roger S, "Software Engineering – A Practitioner's Approach", seventh edition, Pressman, 2010.
- [2] Pearson Edu, "Software Engineering by Ian Sommerville", 9th edition, 2010.
- [3] Hans Van Vliet, "Software Engineering: Principles and Practices", 2008.
- [4] Richard Fairley, "Software Engineering Concepts", 2008.

Course Outcomes:

After the completion of course student will be able to:

- Understand the process of software development.
- Learn the concept of change of request
- Better understanding of the layering architecture

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIR2G2:Embedded Real Time Operating Systems (RTOS)		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Objective: provide an understanding of general embedded system concept, Embedded Software development, RTOS essentials, advantages and trade-offs. It will provide practical experience necessary to use an RTOS in an embedded system development

Prerequisites: Operating system, Microcontrollers and C Programming

COURSE CONTENTS

Unit I

Introduction

Introduction to UNIX/LINUX, Overview of Commands, File I/O (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

Unit II

Real Time Operating Systems

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

Unit III

Objects, Services and I/O

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

Unit IV

Exceptions, Interrupts and Timers

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

Embedded Firmware:

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit V

Case Studies of RTOS

RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

Text Books and References

- [1] Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011
- [2] Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
- [3] Advanced UNIX Programming, Richard Stevens
- [4] Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaug

Course Outcomes:

After the completion of course student will be able to:

- Understand the Real time concept for Embedded system..
- Develop various hardware and software merged applications.
- Better understanding of Interrupts, timers, component configurations for research and development.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2G3:Modelling and Simulation	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objectives:

To give exposure of stochastic processes and to show their importance in engineering education and research. To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give hands on experience in MATLAB to be used as a simulation tool for the stochastic processes. To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of probability theory.

COURSE CONTENTS

Unit I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

Unit II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernouli pmf, Binomial pmf, Geometric pmf, Poisson pmf, Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable.

Unit III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

Unit IV

Markov Processes -Introduction to Continuous Time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poisson Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

Unit V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

Text and Reference Books:

- [1] S.M. Ross, "Introduction to Probability Models, 9th Edition, Elsevier Publication", 2007.
- [2] K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition , A Wiley-Interscience Publication.
- [3] Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition, Ta McGraw-Hill Publication.
- [4] A Papoulis, S.V Pillai, "Probability Random Variables and Stochastic Processes", 4th Edition, TMH Publication, 2002.

Course Outcomes:

After the completion of course student will be able to:

- Develop application based on the research work using MATLAB.
- Enhance research oriented work.
- Better understanding of Markov Chains for research and development.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2G4: Industrial Communication	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Prerequisites: Programming ability and an understanding of basic networking, OS, and architecture issues. **Objective:** The focus of the course is on the protocols, algorithms and tools needed to support the development and delivery of advanced Industrial network for Control and communication

COURSE CONTENTS

Unit I

Historical Overview of Industrial Automation and Communication Networks, Hierarchical Levels in Industrial, Communication Networks, Transmission Methods, Industrial Network Components, Network Topology.

Serial Communication Standards: Standards organizations, Serial data communication interface standards, Balanced and unbalanced transmission lines, Synchronous & asynchronous communication, RS 232,422,485 interface standards and Troubleshooting.

Parallel Communication Standards : Parallel data communications interface standards - General purpose interface bus (GPIB) or IEEE - 488, The Centronics interface standard, The universal serial bus (USB), Different configuration modes - two wire & four wire point - to -point & multidrop connections.

Unit II

HART Communication protocol - Evolution of signal standards, features of HART protocol, Communication modes, HART networks, HART Data format or telegram structure, field device & Control system interface to HART bus, HART cabling considerations, HART commands and types, HART field controller implementation, 3 layers of HART-OSI model, DDL and compatibility, Advantages and applications of HART protocol.

Unit III

Field Bus: Basics, Architecture, OSI -model, FF/Foundation FB segments, interconnection type - distributed and Chicken foot, FFB types -H1 & HSE, Network design and system configuration, General considerations, advantages of FB & Foundation FB and their comparison.

Unit-IV

Controller Area Network DeviceNet, CANopen, Interbus, Actuator Sensor Interface (AS-I), ControlNet.

Unit-V

An Introduction to Industrial Ethernet Ethernet's Roots', Ethernet Physical Layer, Data Link Layer, The Ethernet Frame, Hubs and Switches, Higher Level Network Functions, Ethernet and Industrial Systems, Industrial Ethernet communication protocols

Text Books and References:

- [1] Steve Mackay, John Park and Edwin Wright, "Practical Data Communication for Instrumentation and Control", Newnes Elsevier, 2002.
- [2] David Bailey and Edwin wright , "Practical SCADA for industry", Newnes Elsevier.
- [3] Romilly Bowden, 'HART application Guide', HART Communication Foundation, 1999.

Course Outcomes:

After the completion of course student will be able to:

- Develop algorithms and tools based on the research work for various industry.
- Enhance research oriented work.
- Better understanding of Basics, Architecture, OSI -model for research and development work

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2E1: Analog and Digital VLSI Circuit Design	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT II

MOS Transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on delay and power dissipation.

UNIT IV

CMOS Circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation **Text and Reference Books:**

- [1] Sung-mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuit analysis and Design, 3rd Edition, Tata McGraw-Hill.
- [2] Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, 2nd Edition, PHI, (anded), AW/Pearson, 2001.
- [3] CMOS mixed-signal circuit design by R. Jacob Baker Wiley India, IEEE press, reprint 2008.
- [4] Design of analog CMOS integrated circuits by Behad Razavi McGraw-Hill, 2003.

List of Experiment:

Note : Use the BSIM3v3 (T-SPICE Level 49) model to characterize a 0.18 μ m CMOS process (TSMC).

1. Determine the threshold voltage V_{TH} , for the NMOS and PMOS devices (for $V_{BS}=0$, $L=0.18\mu\text{m}$ and $W= 1\mu\text{m}$), by extrapolating from the I_D-V_{GS} curve at low V_{DS} . Explain your circuit setup. How does this result compare to values reported in the model file? Also, determine the body-effect parameter.

2. Determine the subthreshold slope factor S for the NMOS and PMOS devices (at $V_{DS} = 1.8V$, room temperature). Determine the leakage currents at $V_{GS} = 0 V$. Repeat it at a lower temperature $T = 77K$.
3. Determine the effects of channel length L on the threshold voltage V_{Th} between $0.18 \mu m$ to $2.0 \mu m$. Draw V_{Th} of the NMOS and PMOS as a function of L (for $V_{DS} = 1.8$ and $1.2V$).
4. Determine the effects of drain-source voltage V_{DS} , on the threshold voltage V_{Th} between and $1.8V$. Draw V_{Th} as a function of V_{DS} (for $L = 0.18 \mu m$). What is the measured DIBL factor?
5. With the given CMOS inverter Circuit calculate and estimate the static Characteristics Determine the VTC of CMOS Inverter
Obtain the NM_H , NM_L , and V_M for the inverter Dynamic Characteristics
Measure the t_{pHL} , t_{pLH} , t_p , t_r , t_f
Power Consumption with varying load capacitances from $100fF$ to $500fF$. And compute the power Delay Product (PDP) for the 0.18 Micron technologies.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2E2: Analytical Instrumentation	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective: This course exposes the students to various instruments and techniques used in the analysis and Identification of elements and compounds

Prerequisite: Knowledge of basic Electronics and Fundamentals of Chemistry

COURSE CONTENTS

Unit I

Colorimeters, Visible-Ultraviolet Spectrometers (single beam, Direct reading), **Infrared Spectrometers:** Basic components, Types of IR spectroscopy, **Atomic Absorption Spectrometers:** Flame photometer (principal and constructional details), principle of AAS, radiation sources, Burners and Flames, Plasma Excitation sources.

Unit II

Fluorimeters: Principle of Fluorescence, Measurement of fluorescence, Phosphorimeters, **Raman Spectrometer:** The Raman effect, Source, sample chamber, spectrometer and detector, Photo Acoustic, Photo thermal Spectrometers **Mass Spectrometers:** Principle of operation, Types of MS, Components of MS, ICP- MS

Unit III

Nuclear Magnetic Resonance Spectrometers: Principle of NMR, Types of NMR, Constructional details of NMR, **Electron Spin Resonance Spectrometers:** Basis ESR spectrometer and constructional details, Electron and Ion Spectroscopy, Basic X-ray Spectrometers

Unit IV

Gas Chromatographs, Liquid Chromatography, Thermo Analytical Methods

Unit V

PH Meters, Blood Gas Analyzer, Industrial Gas Analyzers, Environmental Pollution Monitoring Instruments

Text and Reference Books:

- [1] H. H. Williard, L. L. Merrit, J. A. Dean, and F. A. Settle, Instrumental Methods of Analysis, 7/e, CBS Publishers and Distributors, India, 1988
- [2] D. A. Skoog, F. J. Holler, and T. A. Nieman, Principles of Instrumental Analysis, 6/e., Thomson Learning, 1998
- [3] R. S. Khandpur, Handbook of Analytical Instruments, Tata McGraw Hill, New Delhi
- [4] R. K. Jain, Mechanical and Industrial Measurements, Khanna Publishers, Delhi, 1985
- [5] G. W. Ewing, Instrumental Methods of Chemical Analysis, 5/e., McGraw Hill, Singapore, 1992.
- [6] R. E. Sherman and L. J. Rhodes (Eds), Analytical Instrumentation, ISA Press, New York, 1996.
- [7] B. G. Liptak, Process Measurement and Analysis, 3rd ed., Chilton Book Company, Pennsylvania, 1995
- [8] Behrouz A. Forouzan, Data Communications and Networking, 4/E Tata McGraw-Hill, 2000.

Course Outcomes:

After the completion of course student will be able to:

- Develop algorithms and tools based on the research work for various industry.
- Enhance research oriented work.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIR2E3: Optical and Laser Instrumentation		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

CONTENTS

Unit I

Laser Fundamentals: coherence; Spatial and Temporal, Laser theory; absorption, Spontaneous and Stimulated emission, Population inversion, pumping, Einstein coefficient, Resonators, mirrors and modes, Laser output, Q switching, modulation of output by different techniques.

Unit II

Laser Systems & Instrumentation: Principle and construction of different Laser sources-solid state, gas, He-Ne Gas laser, Ruby Laser, CO2 laser, semiconductor and free electron lasers. Tunable lasers etc., Lengths, displacement and shape measurement; laser heterodyne, Laser Doppler and particle image velocimetry

Unit III

Laser applications: LIDARs (Light Detection And Ranging), Laser alignment, gauging inspection and Laser machine vision, laser material processing, Laser applications to chemical and environmental Analysis, Laser- induced fluorescence, Temperature measurement techniques, Laser Tweezers: Single-and multiple-beam tweezers, and applications.

Unit IV

Holography and Speckle based NDT: Principle of Holography, Holographic Interferometry; Double exposure, Time averaged, Real time H.I., Laser speckle techniques; speckle photography/interferometry, and digital speckle pattern interferometry and applications of laser speckles, Lengths, displacement, Velocity, slope and shape measurement etc., Optical coherence tomography: biomedical applications.

Unit V

Fiber Optic Sensors: Basics of Optical fiber as sensing device, classification of fiber sensors, intensity, phase, frequency, wavelength modulated sensors, measurement of temperature, pressure, liquid level, displacement, flow, electric and magnetic fields.

Books Recommended:

- [1] Optical Electronics : Ghatak & Thygarajan, Cambridge University Press
- [2] Basics of Holography : P. Hariharan, Cambridge University Press
- [3] Optical Metrology: Kjell J. Gåsvik, John Wiley & Sons, Ltd, 2013
- [4] Optics: Eugene Hecht, Pearson Education Ltd., 2014
- [5] Fiber Optic Sensors, Second Edition, Shizhuo Yin, Paul B. Ruffin, Francis T.S. Yu, CRC Press, 2008

Course Outcomes:

After the completion of course student will be able to:

- Develop algorithms and tools based on the research work for biomedical applications development.
- Enhance research oriented work based on Holography and Speckle based NDT.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIR2E4: Advanced Industrial Drives and Control	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To study the different motors used in industry and their driving circuits.

COURSE CONTENTS

Unit I

Introduction to Power Devices: Construction, Working, Characteristics, Specifications and applications of SCR, TRIAC, DIAC, Power MOSFET, IGBT and UJT. SCR gate triggering and commutation circuits. Series and parallel connection of SCR and its triggering arrangement. Choppers: Principle, Working, Classification, Thyristorised Choppers- Jones Chopper, Morgan Chopper, Single Phase and Three Phase Controlled rectifiers, (Half wave, full wave and bridge configuration with resistive and Inductive Load. Inverters and choppers, Single- phase rectifiers and single phase controlled Inverters: Classification, Single Phase half bridge and full bridge Inverters, PWM Inverters

Unit II

Motors Fundamentals and Mechanical Systems: DC motor - Types, induced emf, speed-torque relations; Speed control – Armature and field control; Ward Leonard control – Constant torque and constant horse power operations. Review of Induction Motor operation – Equivalent circuit – Performance of the machine with variable voltage, rotor resistance variation, pole changing and cascaded induction machines, slip power recovery – Static Kramer Drive. Synchronous, Brush less DC and Switched Reluctance Drives

Unit III

Converter and Chopper Control: Principle of phase control – Series and separately excited DC motor with single phase and three phase converters – waveforms, performance parameters, performance characteristics - Operation with free wheeling diode schemes; Drive employing dual converter. Introduction to time ratio control and frequency modulation; Class A, B, C, D and E chopper controlled DC motor – performance analysis, multi- quadrant control.

Unit IV

VSI and CSI Fed Induction Motor Control: AC voltage controller fed induction machine operation – Energy conservation issues – V/f operation theory – requirement for slip and stator voltage compensation. CSI fed induction machine – Operation and characteristics - PWM controls. Field oriented control of induction machines – Theory – DC drive analogy – Direct or Feed back vector control - Indirect or Feed forward vector control – Flux vector estimation - Space Vector Modulation control, Direct torque control of Induction Machines – Torque expression with stator and rotor fluxes, DTC control strategy – optimum switching vector selection – reduction of torque ripple methods

Unit V

Special purpose Machines and control: Stepper motor: Working principle, construction, types, application and characteristics. Half and full step sequence, driving circuit using L297, L298 Servo motor: Working principle, construction, types, application and characteristics, Universal Motor: Working principle, construction, types, application and characteristics

Text and Reference Books:

- [1] Gopal K Dubey, “Power Semiconductor controlled Drives”, Prentice Hall Inc., New Jersey, 1989.
- [2] Bimal K Bose, “Modern Power Electronics and AC Drives”, Pearson Education Asia 2002.

- [3] Vedam Subramanyam, “Electric Drives – Concepts and Applications”, Tata McGraw Hill, 2000.
- [4] R.Krishnan, “Electric Motor Drives – Modeling, Analysis and Control”, Prentice- Hall of India Pvt. Ltd., New Delhi, 2003.
- [5] Austin Hughes, “Electric Motors and Drives – Fundamentals, Types and Applications”, Elsevier – a division of Reed Elsevier India private Limited, New Delhi, 2006.

Course Outcomes:

After the completion of course student will be able to:

Different technology for Chopper, Morgan Chopper ,Single Phase and Three Phase Controlled rectifiers etc.

M. E. Electronics (Spl in Digital Communication) (FULL TIME)
Curriculum & Syllabus
Batch 2015– 2016 and onwards

S. No.	Category	No. of Credits			
		SEM I	SEM II	SEM III	SEM IV
1.	Course Compulsory	15	15	-	-
2.	Generic Elective	4	4	-	-
3.	Programme Elective	5	5	-	-
4.	Skill development	2	2	-	-
5.	Seminar/ Workshop	2	2	-	-
6.	Dissertation Phase	-	-	12	12
Actual Credits per Semester		28	28	12	12
Total actual Programme Credits					80
7.	Virtual Credited Comprehensive Viva	4	4	4	4
Total Credits per Semester		32	32	16	16
Total Programme Credits					96

**M. E. Electronics (Spl in Digital Communication) (FULL TIME)
Curriculum & Syllabus
Batch 2015– 2016 and onwards**

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	DCR1C1	Modern Communication System	3-1-1	PC1
2.	DCR1C2	Embedded System using ARM Microcontroller	3-1-1	PC2
3.	DCR1C3	Advance Computer Networking	3-1-1	PC3
4.	DCR1Gx	Generic Elective I	3-1-0	GE1
5.	DCR1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	DCR1W1	Seminar/ Workshop/Research Tool	0-2-0	
8.	DCR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
		List of Generic Elective I	L-T-P	
1.	DCR1G1	Advance System Design	3-1-0	
2.	DCR1G2	Wireless Sensor Network	3-1-0	
3.	DCR1G3	Advance Digital Signal Processing	3-1-0	
4.	DCR1G4	Information Theory and Coding	3-1-0	
		List of Elective I	L-T-P	
1.	DCR1E1	Satellite Communication	3-1-1	
2.	DCR1E2	Object Oriented Programming	3-1-1	
3.	DCR1E3	Embedded RTOS	3-1-1	
4.	DCR1E4	Software Engineering	3-1-1	
SEM II				
1.	DCR2C1	Modelling and Simulation	3-1-1	PC4

2.	DCR2C2	Mobile Communication Networks	3-1-1	PC5
3.	DCR2C3	System Design Using Verilog	3-1-1	PC6
4.	DCR2Gx	Generic Elective II	3-1-0	GE2
5.	DCR2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	DCR2W2	Seminar/ Workshop/ Research Tool	0-2-0	
8.	DCR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
		List of Generic Elective II	L-T-P	
1.	DCR2G1	Broadband Access Technology	3-1-0	
2.	DCR2G2	Nanodevices & Nanosensors	3-1-0	
3.	DCR2G3	Advance Antenna System	3-1-0	

4.	DCR2G4	Industrial Communication	3-1-0	
		List of Elective II	L-T-P	
1.	DCR2E1	Analog and Digital CMOS Circuit Design	3-1-1	
2.	DCR2E2	Network Security	3-1-1	
3.	DCR2E3	Mobile Computing	3-1-1	
4.	DCR2E4	Software testing and Quality assurance	3-1-1	

Devi Ahilya University, Indore, India				ME – I Year (Spl Digital Communication)			
Institute of Engineering & Technology				Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours	per	Week				
DCR1C1 Modern Communication System	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems. To analyze and evaluate performance of a digital communication system.

Prerequisite(s): Basic knowledge of digital communication

COURSE CONTENTS

UNIT -I

Review of basic concepts of communication systems, Source encoding, Speech encoding techniques (Source encoders, SBC, LPC, Hybrid coders), their applications, Base-band modulation techniques their comparison and spectrum associated with their waveforms.

UNIT -II

Channel coding-Linear Block Codes, Convolution Codes, Turbo Codes their encoding and decoding, introduction to high level channel codes, interleaving and concatenated codes. Digital modulation and demodulation - PSK, DPSK, QPSK, M-aryPSK, QAM, MSK and GMSK their generation, detection & performance analysis and comparison in presence of noise.

UNIT -III

Multi-carrier modulation and OFDM, Orthogonality, Block diagram of OFDM, Applications of OFDM, Issues in OFDM systems. Spread spectrum systems: Types, PN sequences, Characteristics of PN sequences, generation and detection of DSSS and FHSS, Spreading gain, Applications to communication systems, Multi-user detection.

UNIT -IV

Wireless channels and propagation path loss models – ISI, Types of fading, models for multi-path reception, propagation models for wireless networks, Fading mitigation techniques, Equalization principle and types (LTE, ZFE, MMSE and DFE).

UNIT -V

Diversity techniques (frequency, time, and space), Multi-antenna systems, Smart antennas, Beamforming and MIMO system, spatial multiplexing, Tradeoffs among Diversity, Beam-forming gain & spatial multiplexing, Introduction to Cognitive Radio and Cooperative communication.

BOOKS RECOMMENDED

IET-DAVV, CBCS Scheme for Batch 2015-2016 and onwards

- [1] Bernard Sklar, "*Digital Communication*", Pearson Education, 2nd Edition, 2004.
- [2] J.G.Proakis, *Digital Communication*, McGraw Hill, 4th Edition, 2001.
- [3] Lathi B. P., *Modern Analog and Digital Communication Systems*, 3rd Edition, Oxford Univ. Press, 2010.
- [4] Haykins Simon, *Digital Communication*, 3rd Edition, Wiley Publication, 2005.
- [5] I.S. Misra, *Wireless Communications and Networks*, 2nd Edition, TMH, 2009.
- [6] A. F. Molisch, *Wireless Communications*, 2nd Edition, Willey, 2014.
- [7] T. S. Rappaport, *Wireless Communications Principles & Practice*, 2nd Edition, PHI, 2005.

Course OUTCOMES:

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Apply the practice approach towards processes like modulation, Demodulation.
- Will have the idea of Channel Coding, Decoding etc. of physical layer
- Having the practical solution towards modern telecommunication systems.
- Can analyze and evaluate performance of a digital communication system.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR1C2		L	T	P	L	T	P	Total
Embedded System using ARM Microcontroller		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller-based embedded systems. High -level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects. **Prerequisite:** Knowledge of Microprocessor and C++ Programming.

COURSE CONTENTS

UNIT-I

Introduction: Definition of Embedded System, Embedded Systems Vs General Computing Systems, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Core of the Embedded System: General Purpose and Domain Specific Processors, Embedded system architecture: RISC and CISC, RISC: Introduction of ARM Processors, Evolution of ARM, ARM design philosophy, ARM Processor fundamentals: Data flow model, Registers, Program Status Register, Pipeline, Interrupts and Vector Table, ARM Processor Families and Nomenclature.

UNIT -II

ARM Basic Instruction Set: Introduction to 32 bit programming, Instruction Set Architecture of ARM, Addressing modes, Data Processing Instructions, Branch Instructions, Load and Store Instructions, Conditional Instructions, PSR Instructions, Stack Instructions.

UNIT -III

ARM Thumb Instruction Set: Overview, Branch instructions, Data processing instructions, Status register access instructions, Single register load and store instructions, Multiple register load and store instructions, Semaphore instructions, Coprocessor instructions, Stack Instructions, Interrupt Instructions.

UNIT -IV

ARM Programming- Assembly Language Programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, Register Allocation, Conditional Execution and Loops. C programming for ARM: Simple C program using function, pointers, structures, etc, Exception Handling, Interrupts, Interrupt Handling Schemes

UNIT -V

Interfacing and applications programs for LCD display, PWM ,ADC, DAC application, measurement and control of physical parameter as temperature , stepper motor control, DC motor control etc.

Books Recommended:

- [1] “ARM System Developer’s Guide Designing and Optimizing System Software” by Andrew N. Sloss, Elsevier publication, 2004.
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- [2] Arm System-On-Chip Architecture, 2/E , by Par Furber, Pearson Education Limited, 2000.
- [3] “EMBEDDED SYSTEM DESIGN”,By Par Santanu Chattopadhyay, PHI Learning Private Ltd., 2013.
- [4] “Embedded Microcomputer Systems, Real Time Interfacing, by Jonathan W. Valvano –Brookes /Cole, 1999, Thomas Learning.

Course outcomes**AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO**

- Will have the practical understanding of design and interfacing of ARM microcontroller-based embedded systems.
- Can apply high -level languages which are used to interface the ARM microcontrollers to various applications.
- Will perform extensive hands-on labs/projects

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1C3	L	T	P	L	T	P	Total
Advance Computer Networking	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.
Prerequisite(s): Fundamentals of computer networking, concepts of programming and operating systems.

COURSE CONTENTS

UNIT-1

Network Models, OSI Model, TCP/IP Protocol Suite, Addressing, Data Rate Limits, Performance Parameters, Transmission Media, Switching, Data Link Layer, Error Detection and Correction techniques.

UNIT-2

Data Link Control- LLC, HDLC , Multiple Access, Random Access, Wired LANS- Standard Ethernet, Fast Ethernet , Gigabit Ethernet , Wireless LANS, Bluetooth, Connecting Devices.

UNIT-3

Network Layer- Logical Addressing, IPV4 Addresses, IPV6 Addresses, Transition From IPV4 to IPV6, Address Mapping, ARP protocol, ICMP, Unicast Routing Protocols, Multicast Routing Protocols, Routing in Autonomous System

UNIT-4

Transport Layer- Process-To-Process Delivery, User Datagram Protocol (UDP), TCP, SCTP, Congestion Control, Quality of Service, Techniques to Improve QoS

UNIT-5

Application Layer- Domain Name System, Electronic Mail, File Transfer Protocol, HTTP, WWW, Remote Login (TELNET, SSH), Simple Network Management Protocol (SNMP),

Internet Security- Network Layer Security, Transport Layer Security and Application Layer Security, Firewalls

BOOKS RECOMMENDED

- [1] B. Forouzan, "TCP/IP Protocol Suite", McGraw Hill, 3/e, 2006
- [2] Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP Vol. II design, Implementation of Intranets", PHI, 3rd Edition 2000
- [4] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
- [5] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- [6] B. Forouzan, "Data Communication and Networking" 4th Ed Tata McGraw Hills

Course outcomes

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Will work with network layer protocols,
- Learn various routing algorithm,
- Understanding of QOS parameters,
- Application of transport and application layer protocols,
- Will use of cryptography in computer networking.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1G1 Advance System Design	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objective: To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite: Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit 1:

Introduction to digital IC design – full Custom and semicustom design flow and comparison , Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit 2:

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design-Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit 3:

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit 4:

Subsystem design principles-pipelining-Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model-Technology scaling effect on interconnect and -Noise in interconnects.

Unit 5:

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

BOOKS RECOMMENDED:

[1] John M Yarbrough, “Digital Logic Applications and Design”, Thomson learning

[2] Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata McGraw Hill Edition

[3] Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005.

[4] Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer, Third edition, 1999.

Course outcomes

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Will have in-depth knowledge regarding designing of advance digital system.
- Work with system design for timing and performance trade off.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCR1G2	L	T	P	L	T	P	Total
Wireless Sensor Networks	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objectives: To list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks, and propose, implement, and evaluate new ideas for solving wireless sensor network design issues.

Prerequisite(s): Computer Networks

COURSE CONTENTS

UNIT I

Introduction and Overview of Wireless Sensor Networks

Introduction, Brief Historical Survey of Sensor Networks, and Background of Sensor Network Technology, AdHoc Networks, Applications of Wireless Sensor Networks: Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology, Basic Sensor Network Architectural Elements, Home Control, Medical Applications, Basic Wireless Sensor Technology : Introduction, Sensor Node Technology, Sensor Taxonomy, WSN Operating Environment, WSN Trends, Wireless Network Standards: IEEE 802.15.4, ZigBee, IEEE 1451

UNIT II

Medium Access Control Protocols for Wireless Sensor Networks

Introduction, Background, Fundamentals of MAC Protocols, MAC Protocols for WSNs: Schedule - Based Protocols, Random Access - Based Protocols, Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange (CSMA/CD -MAC, CSMA/CA - MAC, Bit -MAC, H-MAC, I-MAC, O-MAC, S-MAC, Ri-MAC, T-MAC, Q-MAC (Query MAC), Q-MAC (QoS MAC), X-MAC)

UNIT III

Routing Protocols for Wireless Sensor Networks

Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time -Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low -Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing,

UNIT IV

Transport Control Protocols and Middle wares for Wireless Sensor Networks

Traditional Transport Control Protocols: TCP (RFC 793), UDP (RFC 768), MobileIP, Introduction, WSN Middleware Principles, Middleware Architecture: Existing Middleware: MiLAN (Middleware Linking Applications and Networks), IrisNet (Internet-Scale Resource-Intensive Sensor Networks Services)

UNIT V

Operating Systems for Wireless Sensor Networks

Introduction, Examples of Operating Systems: TinyOS, Mate, MagnetOS

Books Recommended:

- [1] Wireless Sensor Network by KazemSohraby, Daniel Minoli, TaiebZnati Pub: Wiley.
- [2] Wireless Sensor Networks Signal Processing and Communications by Ananthram Swami, Qing Zhao, Yao -Win Hong, Lang Tong Pub: John Wiley & Sons.
- [3] Ad Hoc Wireless Networks: Architectures And Protocols By Murthy Pub: Pearson Education
- [4] Wireless sensor networks Edited by C. S. Raghavendra Pub: Springer
- [5] Fundamentals of Sensor Network Programming: Applications and Technology By Sridhar S.Iyengar, NandanParameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D. Okoye, Wiley

Course outcomes

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

Learn about the practical solution of various applications of wireless sensor networks.

Apply the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks.

Apply and implement, to evaluate new ideas for solving wireless sensor network design issues.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DRC1G3	L	T	P	L	T	P	Total
Advance Digital Signal Processing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective: To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s): A basic course in Digital signal processing.

COURSE CONTENTS

Unit 1

Overview of DSP, FIR filters, IIR filters, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, Linear prediction & optimum linear filters stationary random process, forward- backward filters linear prediction, solution of normal equation.

Unit2

Multi rate DSP, Sampling rate conversion, poly phase filters, multistage decimator & interpolator, QMF, digital filter banks, DFT in spectral estimation., Adaptive filters & spectral estimation.

Unit 3

Minimum mean square criterion, , LMS algorithm, Recursive least square algorithm, Application of DSP & Multi rate DSP Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications

Unit 4

Image representation : Gray scale and color images , image sampling and quantization. Image enhancement: Filter in spatial and frequency domains , histogram based processing and homomorphic filtering. Edge Detection edge linking, boundary descriptors. Image Segmentation : Thresholding, region based segmentation Image Compression: lossy and lossless compression techniques.

Unit 5

Entropy coding, lossy and lossless predictive coding, uniform and non uniform quantizers, transform based compression, JPEG, Image reconstruction from projections: Principles, mathematical basis of tomography. Projections, The Fourier Slice Theorem, Reconstruction Algorithms for Parallel Projections, Three dimensional projections. Computer visualization

of 3D data :Rendering techniques: Surface based and volume based techniques. Direct Volume rendering: Ray casting, opacity function. Maximum Intensity Projection

BOOKS RECOMMENDED:

- Gonzalez and Woods :Digital Image Processing, Pearson Education 3rd Edition
- A.K.Jain : Fundamentals of Digital image processing , PHI
- J.G. Proakis and D.G .Manolakis Digital signal processing: Principles, algorithm and applications, Macmillan publishing
- IfeachorE.C., Jervis B.W. Digital signal processing, a Practical approach, 2nd ed. Pearson edu. 2003.
- Salivahanan, Vallavaraj&Gnanpriya Digital signal processing:: Tata Mcgraw Hill
- References:
- S.W.Smith Digital signal processing: A practical guide for engineers and scientists, Elsevier
- S.K.Mitra , Digital signal processing:: Tata Mcgraw Hill

Course outcomes

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Having knowledge of different DSP algorithms.
- Learn the concept of speech, multimedia and other signal processing applications.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1G4	L	T	P	L	T	P	Total
Information Theory and Coding	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives: To understand encoding and decoding of digital data streams. To introduce methods for the generation of these codes and their decoding techniques. To have a detailed knowledge of compression and decompression techniques.

Pre-requisites: To have the basic knowledge of digital and analog communication systems, and channels.

COURSE CONTENTS

Unit I

Information theory

Concept of amount of information - units, Entropy -marginal, conditional and joint entropies -relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.

Unit II

channels

Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, Shannon theorem. Continuous channels – Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

Unit III

Source coding

Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes – Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.

Unit IV

Error detection and correction

Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes – Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

Unit V
Convolutional codes

Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes -Viterby algorithm, Sequential decoding -Stack algorithm. Interleaving techniques – Block and convolutional interleaving, Error Control and Signal Space Coding

Course outcomes:

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Apply encoding and decoding of digital data streams..
- Apply methods for the generation of these codes and their decoding techniques.
- Having detailed knowledge of compression and decompression techniques.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credits			
DCRIE1 Satellite Communication	L	T	P	L	T	P	Total
Duration of Theory Paper: 6 Hours/week	3	1	2	3	1	1	5

Course Objectives: The course provides fundamentals, link design, overview of practical consideration and applications of satellite communication.

Prerequisite(s): Fundamentals of communication systems.

COURSE CONTENTS

Unit I

SATELLITE ORBITS: Kepler’s Laws, orbital mechanics and parameters, – Look Angle Determination, orbital perturbations-longitudinal and inclination changes, geo stationary and non-geo-stationary orbits, Orbital Effects in Communications system performance-Doppler shift, range variations, solar eclipse, sun transit outage, Launching Procedures - launch vehicles.

Unit II

SATELLITE SUB-SYSTEMS AND LINK DESIGN: Satellite sub systems, Attitude and Orbit control system, Telemetry, Tracking and command. Communication sub-systems-Description of the communication system and various types of transponders, satellite antennas.

Satellite link design-Basic transmission theory, system noise temperature and G/T ratio, design of downlinks, satellite system using small earth stations, uplink design, system design examples, Ku band uplink and downlink design and rain effects on Ku band.

Unit III

MODULATION AND MULTIPLEXING TECHNIQUES FOR SATELLITE LINKS: Frequency modulation, Analog FM transmission by satellite, digital transmission, digital modulation and demodulation digital transmission of analog signals, time division multiplexing- TDM terminology, TDM systems and channel synchronization in TDM.

Unit IV

MULTIPLE ACCESS TECHNIQUES USED IN SATELLITE COMMUNICATION: FDMA-intermodulation, calculation of C/N with intermodulation, TDMA-Bits, symbol and channels, frame structure, TDMA in a fixed station network- synchronization and transmitter power in TDMA networks, CDMA, spread spectrum transmission and reception, CDMA in a fixed earth station and LEO satellite network.

Unit V

SATELLITE APPLICATIONS: VSAT Systems-overview, network architecture, access control protocols, modulation and multiple access selection, VSAT earth station and calculation of link margin, Low earth orbit and Non Geo –stationary satellite systems-Orbit consideration, coverage and frequency consideration, delay and throughput considerations, system considerations, DBS system, Satellite navigation and the Global Positioning System .

BOOKS RECOMMENDED:

- [1] T. Pratt, C. Bostain, J. Allnutt, 'Satellite Communications', Second Edition, John
- [2] M. Richaria, 'Satellite Communication Systems Design Principles'
- [3] Bruce R. Eber, 'The Satellite Communication Applications' Hand Book, Artech
- [4] Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.
- [5] Emanuel Fthenakis, 'Manual of Satellite Communications', McGraw Hill Book
- [6] Brian Ackroyd, 'World Satellite Communication and earth station Design', BSP professional Books, 1990.
- [7] G..B.Bleazard, 'Introducing Satellite communications NCC Publication, 1985.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name		Instructions			Credits			
		Hours per Week						
DCR1E2	L	T	P	L	T	P	Total	
Object Oriented Programming	3	1	2	3	1	1	5	
Duration of Theory Paper: 3 Hours								

Course Objectives: The aim of the course is to give a thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking.

Prerequisite(s): Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C.

COURSE CONTENTS

UNIT -I

Introduction to Object Oriented Programming and Java :

Object Oriented Concepts, Abstraction, Encapsulation, Information Hiding. Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods

UNIT -II

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

UNIT -III

Exception Handling, Multithreading and Introduction to Java APIs:

Exceptions: Need for exceptions, Checked V/s Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle. String Handling, Wrapper classes: Arrays and Vectors

UNIT -IV

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

UNIT -V

Introduction to elementary procedures, Real & Complex vector and Matrix & Determinants and operations like: Initialization, Duplication, Elimination, Interchanging, Rotation, Norms, Scaling, Multiplication & calculation of rank etc., Evaluation of various polynomials like Chebyshev polynomial, Fourier polynomial etc., Analysis of real matrix problems like: Overdetermined systems, underdetermined system, homogenous, pseudo inversion. Sparse Real matrices, Similarity Transformation, Eigen value problems.,

Numerical differentiation, Differential equations, Introduction to special functions like: Exponential, Gamma, Error, Infinite time series, Fast Fourier transforms etc

BOOKS RECOMMENDED:

- [1] Hang T. Lau, *A Numerical Library in Java for Scientist & Engineers*, Library of Congress Cataloging-in-Publication Data by Chapman & Hall/ CRC Press Company.
- [2] Cay S. Horstmann, *Core JAVA Vol-1*, Pearson Education.
- [3] Herbert Schildt, *The complete Reference*, Tata McGraw Hill.
- [4] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, Oreilly

Course outcomes:

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Will perform and understand the concept of link design
- Can apply the practical consideration and applications of satellite communication.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCR1E3	L	T	P	L	T	P	Total
Embedded RTOS	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective: provide an understanding of general embedded system concept, Embedded Software development, RTOS essentials, advantages and trade-offs. It will provide practical experience necessary to use an RTOS in an embedded system development
Prerequisites : Operating system, Microcontrollers and C Programming

COURSE CONTENTS

UNIT – I:

Introduction

Introduction to UNIX/LINUX, Overview of Commands, File I/O (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II:

Real Time Operating Systems

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS,

Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - III:

Objects, Services and I/O

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV:

Exceptions, Interrupts and Timers

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time

Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

Embedded Firmware:

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - V:

Case Studies of RTOS

RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

Books Recommended:

- [1] Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011
- [2] Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
- [3] Advanced UNIX Programming, Richard Stevens
- [4] Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaug

Course Outcomes:

After the completion of course student will be able to

- Solve the problem regarding the embedded system concept
- Solve the problems related to Embedded Software development,
- Will have practice knowledge about RTOS essentials, also learn advantages and trade-offs. It will provide practical experience necessary to use an RTOS in an embedded system development

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCR1E4	L	T	P	L	T	P	Total
Software Engineering	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives:The main purpose of this course is to impart knowledge on the basic principles of software development life cycle.

Prerequisite: Knowledge of Basic Data Types - Lists, Stacks, Queues, Hash Tables ,Trees - Binary Trees, Tree Traversal, Memory Management - Storage Allocation, Garbage Collection, Algorithms - Divide and Conquer, Backtracking, Iterative Techniques, Searching and Sorting,Complexity - O-Notation

COURSE CONTENTS

UNIT I

INTRODUCTION

Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process-Agile development-Agile Process- Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity.

UNIT II

REQUIREMENTS

Requirements Engineering-Establishing the Groundwork-Eliciting Requirements-Developing use cases-Building the requirements model-Negotiating, validating Requirements-Requirements Analysis-Requirements Modeling Strategies.

UNIT III

DESIGN MODELING WITH UML

ModelingConcepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams - Diagram Organization- Diagram Extensions. Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, IET-DAVV, CBCS Scheme for Batch 2015-2016 and onwards

Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements .

UNIT IV

SOFTWARE IMPLEMENTATION

Structured coding Techniques-Coding Styles-Standards and Guidelines- Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism.

UNIT V-

TESTING AND MAINTENANCE

TESTING: Software Quality- Software Quality Dilemma- Achieving Software Quality-Testing: Strategic Approach to software Testing- Strategic Issues- Testing: Strategies for Conventional Software, Object oriented software, Web Apps-Validating Testing- System Testing- Art of Debugging.

MAINTENANCE: Software Maintenance-Software Supportability- Reengineering-Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering

Books Recommended:

- [1] Roger S, "*Software Engineering – A Practitioner’s Approach*", seventh edition, Pressman, 2010.
- [2] Pearson Edu, "*Software Engineering by Ian Sommerville*", 9th edition, 2010.
- [3] Hans Van Vliet, "*Software Engineering: Principles and Practices*"–, 2008.
- [4] Richard Fairley, "*Software Engineering Concepts*", 2008.

Course Outcomes:

After the completion of course student will be able to

- Having knowledge of implementation of Data Types - Lists, Stacks, Queues.
- Practise problem solving approach with the help of Hash Tables ,Trees - Binary Trees, also Learn the concept of Tree Traversal, Memory Management
- They have practise approach towards Storage Allocation, Garbage Collection, Algorithms
- Implementation of Divide and Conquer, Backtracking, Iterative Techniques, Searching and Sorting,Complexity - O-Notation

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR1S1:	L	T	P	L	T	P	Total
Soft Skill-1	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management-Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- [1] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [2] Kumar Mahi. Stress Coping Skills Ebook, [Health & Medicine, Technology](#), 2009.
- [3] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [4] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [5] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
 - Will perform SWOT Analysis
 - Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
 - Apply the Critical Thinking in Problem Solving Steps in .
 - Will have the knowledge of the General Adaptive Syndrome Model of Stress..
 - Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2C1	L	T	P	L	T	P	Total
Modeling and Simulation	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To give exposure of stochastic processes and to show their importance in engineering education and research To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s): Fundamental knowledge of Probability Theory.

COURSE CONTENTS

UNIT –I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernouli pmf, Bionomial pmf, Geometric pmf, Poisson pmf, Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable.

UNIT –III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes -Introduction to Continues Time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

BOOKS RECOMMENDED

- [1] S.M. Ross, "Introduction to Probability Models, 9th Edition, Elsevier Publication",
- [2] 2007.
- [3] K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition , A Wiley-Interscience Publication.
- [4] Averill M. Law,W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition,
- [5] Tata McGraw-Hill Publication.
- [6] A Papoulis, S.VPillai, "Probability Random Variables and Stochastic Processes", 4th
- [7] Edition, TMH Publication, 2002.

Course Outcomes:

After the completion of course student will be able to

- Will have exposure of stochastic processes and to show
- Will develop skills to identify a process, its inputs and outputs.
- Able to develop a model and quantify the results.
- Will have hands on experience in MATLAB to be used as a simulation tool for the stochastic processes
- Will have an orientation towards research in electronics and computer engineering.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2C2	L	T	P	L	T	P	Total
Mobile Communication Networks	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To provide the knowledge of cellular concept, types of wireless networks, different generations mobile communication systems,, and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite(s): Knowledge of digital communication, OSI Model and internet protocol.

COURSE CONTENTS

Unit 1

Evolution of Modern Mobile Wireless Communication Systems : Different types of Wireless Communication, Classification of Wireless Networks: Wireless Local Area Networks, Personal Area Networks, Fixed Wirelessli Access, Ad-hoc and Sensor Networks, Satellite Cellular Communication, First Generation, Second Generation, Third Generation wireless Networks, All-IP Networks, Requirements for services, Technical Challenges of Wireless Communications.

Unit 2

Cellular Systems Design Fundamentals: Multiple access Techniques, Cellular Structutre, Cell Cluster, Frequency Reuse, Co-channel and Adjacent channel Interference, Enhancement of system Capacity, Channel Assignment, Cellular Communication priciples, Mobility Management, Radio Resource Management, 1G AMPS system.

Unit3

2G and 2.5 G Systems: GSM system architecture, Air interface, Lgical and Physical Channels, Voice encoding, channel encoding, Cryptography, Frequency hopping,

Equalization in GSM, Connection establishment and Handover, Protocols and Signaling, Services and Billing.

GPRS system architecture, Signaling, Roaming, Interfaces and Related Protocols, IP internetworking Model, GPRS applications.

Unit 4

3G Systems: WCDMA/UMTS: System Overview, Air Interfaces, Physical and Logical Channels, Speech coding, Multiplexing, Channel Encoding, Spreading, Modulation, Power control, Connection Establishment, Handover.

3GPP LTE: System Overview, Physical Layer, Logical and Physical Channels, Physical Laye Procedures.

Unit 5

IP for Mobile Networks : Overview of IP, IP Routing protocols, Basic Mobile IP, IP for GPRS and UMTS, Integration of different Technologies, Mobility management in Wireless Networks, All IP Networks, Key technologies for 4G.

BOOKS RECOMMENDED:

- [1] A. F. Molisch, "Wireless Communicatins", Second Edition, Wiley Publications, 2014.
[2] I. S. Misra, "Wireless Communications & Networks", Second Edition, MGH, 2013.
[3] J. Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.
[4] T. S. Rappaport, Wireless Communications Principles & Practice, 2nd Edition, PHI, 2002.

Course Outcomes:

After the completion of course student will be able to

- Having practical knowledge of cellular concept,
- Learn about various types of wireless networks.
- Learn about different generations mobile communication systems,.
- Having the knowledge of various aspects of mobile radio environment .

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2C3 System Design Using Verilog	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog .Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s): Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

UNIT –I

Overview of Digital Design with Verilog HDL -Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts -Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts -Lexical conventions, data types, system tasks, compiler directives.

UNIT -II

Modules and Ports-Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling -Modeling using basic Verilog gate primitives, description of andlor and buflnot type gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling -Continuous assignments, delay specification, expressions, operators,operands, operator types.

UNIT -III

Behavioral Modeling -Structured procedures, initial and always, blocking'and nonblocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation. **Useful**

Modeling Techniques -Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

UNIT -IV

Timing and Delays -Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling- MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

UNIT -V

Logic Synthesis with Verilog HDL-Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

BOOKS RECOMMENDED

- [1] Samir Palnitkar , “*Verilog HDL-A guige to Digital Design and Synthesis* “ 2nd Edition, Pearson , 2006.
- [2] J. Bhaskar, “*A Verilog HDL Primer*”, B.S Publications,
- [3] Douglas J. Smith, “*Hdl Chip Design : A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog*”.Doone Pubns ,1998.
- [4] Blaine Readler , “*Verilog by Example: A Concise Introduction for FPGA Design*”, Full
- [5] Arc Press, 2011

Course Outcomes:

After the completion of course student will be able to

- Able translate a functional system description into appropriate digital blocks coded in Verilog
- Can solve practical application based on synthesis, place,and route of a digital design into a target FPGA.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR2G1 Broadband Access Networks		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Course Objectives: To provide a detailed structure and working of different networks used for accessing broadband signals.

Prerequisite(s): knowledge of analog and digital communication and basic.s of computer networks

COURSE CONTENTS

Unit 1

Introduction: Broadband access, Its definition, coverage and economin impact, Legacy broadband technologies, Fixed wireline broadband technologies (Digital subscriber line, Cable modem, Broadband over power line), Fixed wireless broadband technologies (MMDS, Free space optics , Satellite) Mobile wireless broadband technologies (GPRS, EDGE, UMTS).

Unit2

WLAN:Types, System architecture, Protocol Architecture, Medium access control CSMA/CA, Comparison of IEEE varients of WLAN (IEEE 802.11 – 802.11 ac), Frame formats, Modulation and coding, High Throughput WLANs., Wi-Fi based Wireless Mesh Networks.

Unit 3

WiMax: System Overview, Fixed Wi-Max, Mobile Wi-max, Physical Layer Overview (Modulation and coding, Physical and logical channels, Multiple antenna Techniques, Link Control), MAC Layer, Multihop relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks.

Unit 4

Optical Networking: Introduction and challenges- Advantages of optical network, WDM optical networks, WDM network evolution, WDM network construction, broadcast and select optical WDM network, wavelength routed optical WDM network, Challenges of optical WDMnetwork.**Optical Access Network** Introduction to access network, PON, EPON , GPON and WDMEPON: overview, principal of operation, architecture, standards; dynamic Bandwidth allocation and Quality of Service.

Unit 5

Optical switching & FiWi access networks Optical packet switching basics, slotted and unslotted networks, header and packet format, contention resolution in OPS networks, self routing, examples on OPS node architecture, optical burst switching, signaling and routing protocols for OBS networks, contention resolution in OBS networks, Radio over Fiber, Radio and Fiber, Integration of EPON and WiMax, Hybrid Wireless-Optical Broadband Access Network / Fiber wireless (FiWi) access networks.

BOOKS RECOMMENDED:

- [1] Optical Network Series: Biswanath Mukherjee, Springer, 2006.
- [2] Optical Networks: R.Ramaswami and K.Sivarajan, Morgan Kaufmann Publishers, 2nd ed., 2002.
- [3] A. F. Molisch, "Wireless Communications", Second Edition, Wiley Publications, 2014.
- [4] Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.
- [5] 3. Optical Switching Networks: Mayer & Martin, Cambridge University Press, 2008.
- [6] Broadband Access Networks -Technologies and Deployments, Editors: Shami, Abdallah, Maier, Martin, Assi, Chadi (Eds.) , Springer, 2009.
- [7] FiWi Access Networks, [Martin Maier](#), [Navid Ghazisaidi](#), Cambridge University Press, 2011.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Fixed wireless broadband technologies (MMDS, Free space optics , Satellite) Mobile wireless broadband technologies (GPRS, EDGE, UMTS)
- Can perform the Comparison of IEEE variants of WLAN (IEEE 802.11 – 802.11 ac).
- Learn about various Frame formats, Modulation and coding.
- Learn the features of Multihop relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks for their practical implementation

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2G2	L	T	P	L	T	P	Total
Nanodevices & Nanosensors	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objectives: this course will focus on understanding of the basic structure principals of Nano-devices and sensors.

Prerequisite(s): Introduce the quantum mechanical concepts needed to understand the operation

COURSE CONTENTS

Unit-I

QUANTUM DEVICES Quantum Electronic devices – Electrons in mesoscopic structures – Short channel, MOS Transistor – split Gate Transistor – Electron wave transistor – Electron spin transistor – Quantum Dot array – Quantum computer- Bit and Qubit. Carbon Nanotube based logic gates, optical devices. . Connection with quantum dots, quantum wires, and quantum wells

Unit-II

TUNNELING DEVICES Tunneling element – Tunnel Effect and Tunneling Elements- Tunneling Diode – Resonant Tunneling Diode – Three -Terminal Resonate Tunneling Devices-Technology of RTD-Digital circuits design based on RTDs - Basics Logic Circuits – Single Electron Transistor(SET) – Principle – Coulomb Blockade- Performance – Technology- Circuit Design- Logic and Memory Circuits – SET adder as an Example of a Distributed Circuit.

Unit-III

NANOSENSORS I Micro and nano-sensors, Fundamentals of sensors, biosensor, micro fluids, Packaging and characterization of sensors, Method of packaging at zero level, dye level and first level. Sensors for aerospace and defense: Accelerometer, Pressure Sensor, Night Vision System, Nano tweezers, nano-cutting tools, Integration of sensor with actuators and electronic circuitry,

Unit-IV

NANOSENSORS II Sensor for bio-medical applications: Cardiology, Neurology and as diagnostic tool, For other civil applications: metrology, bridges etc. Biosensors. Clinical Diagnostics, generation of biosensors, immobilization, characteristics, applications, conducting Polymer based sensor, DNA Biosensors, optical sensors. Biochips. Metal Insulator Semiconductor devices, molecular electronics, information storage, molecular switching, Schottky devices,

Unit-V

NEMS Inertial sensors – accelerometer – gyroscope - micromechanical pressure sensors – pizoresistive –capacitive - microrobotics – micro channel heat sinks – optical MEMS – visual display – precision optical platform – optical data switching – RF MEMS – MEMS variable capacitors – MEMS switches – Resonators.

BOOKS RECOMMENDED:

- K. Goser, P. Glosekotter and J. Dienstuhl, “Nanoelectronics and Nanosystems-From Transistors to Molecular Quantum Devices” , Springer, 2004.
- HerveRigneault, Jean-Michel Lourtioz, Claude Delalande, Ariel Levenson,
 - “Nanophotonics”, ISTE.
- W.R.Fahrner, “Nanotechnology and Nanoelectronics – Materials, Devices and Measurement Techniques” Springer, 2006 13
- Nano Engineering in Science &Technology: An introduction to the world of nano design by Michael Rieth.
- Tai –Ran Hsu, “MEMS & Microsystems Design and Manufacture”, Tata McGraw-Hill publication, 2001.
- P. Rai-Choudhury, “MEMS and MOEMS technology and applications”, PHI learning private Ltd, 2009.
- Mohamed Gad-el-Hak, “The MEMS Handbook”, CRC Press, 2002.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Quantum computer- Bit and Qubit. Carbon Nanotube based logic gates, optical devices.,
- Practical appoces using Digital circuits design based on RTDs - Basics Logic Circuits
- Learn how to use Accelerometer, Pressure Sensor, Night Vision System, Nano tweezers, nano-cutting tools.
- Can perform Integration of sensor with actuators and electronic circuitry.
- Learn the features of Metal Insulator Semiconductor devices, molecular electronics, information storage, molecular switching, Schottky devices,

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2G3	L	T	P	L	T	P	Total
Advance Antenna System	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives: Achieve the skill to analyze and design advanced antennas and antenna systems using numerical techniques

Prerequisites: Electromagnetic field theory.

COURSE CONTENTS

UNIT I

Fundamental Concepts:

Physical concept of radiation, Radiation pattern, near- and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

UNIT II

Radiation from Wires and Loops:

Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

UNIT III

Aperture Antennas:

Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts.

Broadband Antennas:

Broadband concept, Log-periodic antennas, frequency independent antennas.

UNIT IV

Microstrip Antennas:

Basic characteristics of microstrip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Antenna Arrays:

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays.

UNIT V

Basic Concepts of Smart Antennas:

Concept and benefits of smart antennas, Fixed weight beamforming basics, Adaptive beamforming

Books Recommended:

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- [1] C.A. Balanis, "Antenna Theory and Design", 3rd Ed., John Wiley & Sons., 2005.
 - [2] W. L. Stutzman, and G. A. Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons., 1998.
 - [3] R. S. Elliot, "Antenna Theory and Design", Revised edition, Wiley-IEEE Press., 2003.
 - [4] R. E. Collin, "Antennas and Radio Wave Propagation", McGraw-Hill., 1985.
 - [5] F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill., 2005.

Course Outcomes:**After the completion of course student will be able to**

- Learn the Physical concept of radiation, Radiation pattern.
- Having deep knowledge of finite-length dipole, linear elements .
- Practical approach of Huygens' principle,.
- Learn concept of radiation from rectangular and circular apertures.
- Perform Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays.
- Learn the Concept and benefits of smart antennas, Fixed weight beam forming basics, Adaptive beam forming

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2G4 Industrial Communication	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective: The focus of the course is on the protocols, algorithms and tools needed to support the development and delivery of advanced Industrial network for Control and communication

Prerequisites : Programming ability and an understanding of basic networking, OS, and architecture issues.

COURSE CONTENTS

UNIT-I

Historical Overview of Industrial Automation and Communication Networks, Hierarchical Levels in Industrial, Communication Networks, Transmission Methods, Industrial Network Components, Network Topology.

Serial Communication Standards: Standards organizations, Serial data communication interface standards, Balanced and unbalanced transmission lines, Synchronous & asynchronous communication, RS 232, 422, 485 interface standards and Troubleshooting.

Parallel Communication Standards : Parallel data communications interface standards - General purpose interface bus (GPIB) or IEEE - 488, The Centronics interface standard, The universal serial bus (USB), Different configuration modes - two wire & four wire point - to - point & multidrop connections.

UNIT-II

HART Communication protocol - Evolution of signal standards, features of HART protocol, Communication modes, HART networks, HART Data format or telegram structure, field device & Control system interface to HART bus, HART cabling considerations, HART commands and types, HART field controller implementation, 3 layers of HART-OSI model, DDL and compatibility, Advantages and applications of HART protocol.

UNIT-III

Field Bus: Basics, Architecture, OSI -model, FF/Foundation FB segments, interconnection type -distributed and Chicken foot, FF types -H1 & HSE, Network design and system configuration, General considerations, advantages of FB & Foundation FB and their comparison.

UNIT-IV

Controller Area Network DeviceNet, CANopen, Interbus, Actuator Sensor Interface (AS-I), ControlNet.

UNIT-V

An Introduction to Industrial Ethernet Ethernet's Roots', Ethernet Physical Layer, Data Link Layer, The Ethernet Frame, Hubs and Switches, Higher Level Network Functions, Ethernet

and Industrial Systems, Industrial Ethernet communication protocols

Books Recommended:

- [1] Steve Mackay, John Park and Edwin Wright, “Practical Data Communication for Instrumentation and Control”, Newnes Elsevier,2002.
- [2] David Bailey and Edwin wright , “Practical SCADA for industry” , Newnes Elsevier
- [3] Romilly Bowden, ‘HART application Guide’, HART Communication
a. Foundation,1999

Course Outcomes:

After the completion of course student will be able to

- Learn various protocols, algorithms
- Use tools needed to support the development and delivery of advanced Industrial network for Control and communication.
- Will solve the networking, OS, and architecture issues with the help of programs

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCR2E1	L	T	P	L	T	P	Total
Analog and Digital VLSI Circuit Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT -I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT -II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT -III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT -IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit –V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation

BOOKS RECOMMENDED

- [1] Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
- [2] [Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, 2nd Edition, PHI, (anded), AW/Pearson, 2001.
- [3] CMOS mixed-signal circuit design by R. Jacob Baker Wiley India, IEEE press, reprint 2008.
- [4] Design of analog CMOS integrated circuits by Behad Razavi McGraw-Hill, 2003.

Course Outcomes:

After the completion of course student will be able to

- Will learn the the fundamental of CMOS VLSI design.
- Apply different VLSI design methodologies .
- Learn to design combinational, sequential and semiconductor memory circuit .
- Learn about the limitations of CMOS in NANO technology with introduction to the NANO Technology.

List of experiment:

Note : Use the BSIM3v3 (T-SPICE Level 49) model to characterize a 0.18 μ m CMOS process (TSMC).

4. Determine the threshold voltage V_{TH} , for the NMOS and PMOS devices (for $V_{BS}=0$, $L=0.18\mu\text{m}$ and $W=1\mu\text{m}$), by extrapolating from the I_D-V_{GS} curve at low V_{DS} . Explain your circuit setup. How does this result compare to values reported in the model file? Also, determine the body-effect parameter.
5. Determine the subthreshold slope factor S for the NMOS and PMOS devices (at $V_{DS}=1.8\text{V}$, room temperature). Determine the leakage currents at $V_{GS}=0\text{V}$. Repeat it at a lower temperature $T=77\text{k}$.
6. Determine the effects of channel length L on the threshold voltage V_{Th} between $0.18\mu\text{m}$ to $2.0\mu\text{m}$. Draw V_{Th} of the NMOS and PMOS as a function of L (for $V_{DS}=1.8$ and 1.2V).
7. Determine the effects of drain-source voltage V_{DS} , on the threshold voltage V_{Th} between and 1.8V . Draw V_{Th} as a function of V_{DS} (for $L=0.18\mu\text{m}$). What is the measured DIBL factor?
8. With the given CMOS inverter Circuit calculate and estimate the static Characteristics

Determine the VTC of CMOS Inverter

Obtain the NMH, NML, and VM for the inverter

Dynamic Characteristics

- [8]. Measure the t_{pHL} , t_{pLH} , t_P , t_r , t_f

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCR2E2	L	T	P	L	T	P	Total
Network Security	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives:

Prerequisite(s):

COURSE CONTENT

UNIT –I:

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

UNIT –II:

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block ciphers.

Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

UNIT –III:

Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete algorithms.

Message authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

UNIT –IV:

Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD- 160, HMAC.

Digital signatures and Authentication Protocols: Digital signatures, Authentication ,Protocols, Digital signature standards.

Authentication Applications: Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT –V:

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management.

Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms: Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

Books Recommended:

[1] Cryptography and Network Security: Principles and Practice - William Stallings, Pearson

[2] 1.Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.

[3] Principles of Information Security, Whitman, Thomson.

[4] Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH

[5] Introduction to Cryptography, Buchmann, Springer.

Course Outcomes:

After the completion of course student will be able to

- Will have good knowledge of Conventional Encryption model and Steganography
- Learn about various classical Encryption Techniques.
- Learn about Differential and Linear Cryptanalysis.
- Block Cipher Design Principles and Modes of operations.
- Euclid's Algorithm, the Chinese remainder theorem,
- Perform practical application based on Discrete alogarithms.
- Solve the issue regarding Web Security requirements

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1E3	L	T	P	L	T	P	Total
Mobile Computing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: The focus of the course is on development and delivery of Android based software for mobile devices

Prerequisites : Programming ability and an understanding of basic JAVA

COURSE CONTENTS

UNIT-1

An Open Platform for Mobile Development,Native Android Applications,Android SDK Features,Introducing the Open Handset Alliance,Introducing the Development Framework,Developing for Android,Developing for Mobile Devices,Android Development Tools

UNIT-2

Creating Applications and Activities,Introducing the Application Manifest,The Android Application Life Cycle ,Understanding Application Priority and Process States ,Externalizing Resources,Creating User Interfaces,Fundamental Android U I Design,Introducing Views,Introducing Layouts,Creating New Views,Creating and Using Menu s

UNIT-3

Introducing Intents,Introducing Adapters, Using Internet Resources, Introducing Dialogs,Android Techniques for Saving Data,Saving Simple Application Data,Saving and Loading Files,Databases in Android,Introducing Content Providers

UNIT-4

Maps, Geocoding, and Location-Based Services,Setting up the Emulator with Test Providers,Selecting a Location Provider,Using Proximity Alerts,Using the Geocoder,Creating Map -Based Activities,Working in the Background,Introducing Services,Using Background Worker Threads,Introducing Notifications,Using Alarms

UNIT-5

Peer-to-Peer Communication,Introducing Android Instant Messaging,Introducing SMS,Accessing Android Hardware,Using the Media APIs, Camera, Sensor Manager, Accelerometer and Compass,Bluetooth,Android Telephony,Managing Net work and Wi-Fi Connections, Controlling Device Vibration, Advanced Android Development,Paranoid Android,Using AID L to Support IP C for Services,Implementing an AIDL Interface, Building Rich User Interfaces

Course Outcomes:

After the completion of course student will be able to

- Learn the Android Applications
- Practical approaches using Android SDK
- Features, Introducing the Open Handset Alliance,
- Learn how to design application using Android U I
- Practical application creation using Design, Views Layouts.
- Learn how to make Data,Saving and Loading Files
- Creation of Databases in Android,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCR2E4	L	T	P	L	T	P	Total
Software testing and Quality assurance	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To enhance students software testing and analysis skills.

Prerequisites

COURSE OF CONTENTS

UNIT I

QUALITY MODELS

Introduction-views on quality-cost of quality-quality models-Statistics and measurements-Statistics and measurements-Analysis of given source code using SQA and Sonar models.

UNIT II

QUALITY FRAMEWORK and TESTING:

Quality framework characteristics – verification- Measuring test adequacy overview of black box testing techniques-decision tables-combinatorial testing classification tree method- white box testing- Random and exploratory.

UNIT III

SOFTWARE ANALYSIS

Introduction to Static analysis- Static analyzer for finding dynamic programming errors-dataflow testing – procedure to apply data flow testing- examples performance analysis and verification- Security analysis and verification –Software vulnerabilities and exploitation.

UNIT IV

QUASAR METHOD

Applying the Design structure matrix to system decomposition and integration problems-achieving Agility through Architecture visibility-Recovering and verifying architecture through design structure matrices.

UNIT V

QUALITY MANAGEMENT

Project quality management- Essential Testing-Test driven development –guidance for software verification and validation plans-Master test planning.

Books Recommended:

- [1] Edited by KshirasagarNaik and PriyadarshiTripathy, “*Software testing and Quality Assurance: theory and practice*”, John wiley& sons Inc, copyright,2008.
- [2] Daniel Galin, “*Software Quality Assurance from Theory to Implementation*”, Pearson Education Ltd., 2004.

- [3] “*Quality models to engineering quality requirements*” published in journal of object technology, chair of Software engineering, Vol.2, No. 5 Sep. – October2003. Online at <http://www.jot.sm>.
- [4] Tyson R. Browning, A review and new directions, “*Applying the designstructure matrix to system decomposition and integration problems*”, IEEEtransactions on a. Engineering management, Vol. 48, No.3, August 2001.
- [5] [5]. Neerajsangal and frank waldman in the journal of “*Defense softwareengineering Dependency models to mana*”

Course Outcomes:

After the completion of course student will be able to

- Perform Analysis of given source code using SQALE and Sonar models.
- Perform BLACK BOX TESTING AND WHITE BOX TESTING
- Learn the Combinatorial testing classification tree method
- Static analyzer for finding dynamic programming errors-dataflow testing
- Applying the Design structure matrix to system decomposition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR2S2: Soft Skill-2	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	-	-	2	-	-	2

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics,

Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
- [3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ramneek Kapoor, Managerial Skills, Pathmaker Bangalore, Nakoda Publishers & Printers, 1st Ed.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

M.E Mechanical Engineering (Industrial Engineering & Management)
(Full Time)
Proposed Scheme for CBCS

SEM I				
S.N O	Sub Code	Sub Name	Number of Credit	Sub Type
1.	IMR1C1	Productivity & Technology Management	3-1-1	PC1
2.	IMR1C2	Quantitative Techniques for Management	3-1-1	PC2
3.	IMR1C3	Production & Operations Management	3-1-1	PC3
4.	IMR1Gx	Generic Elective I	3-1-0	GE1
5.	IMR1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	IMR1W1	Seminar/ Res. Tool/Work Shop-1	0-2-0	
8.	IMR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I				
1.	IMR1G1	Principles & Practices of Management		
2.	IMR1G2	Human Resource management		
3.	IMR1G3	e –Business & Commerce		
List of Elective I				
1.	IMR1E1	Statistical Quality Control and Total Quality Management		
2.	IMR1E2	Strategic Management		
3.	IMR1E3	Business Process Reengineering		
SEM II				
1.	IMR2C1	Financial Management	3-1-1	PC4
2.	IMR2C2	Materials Management	3-1-1	PC5
3.	IMR2C3	Supply Chain Management	3-1-1	PC6
4.	IMR2Gx	Generic Elective II	3-1-0	GE2
5.	IMR2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	IMR2W2	Seminar/ Res. Tool/Work Shop-2	0-2-0	
8.	IMR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II				
1.	IMR2G1	Project Management		
2.	IMR2G2	Enterprise Resource Planning		
List of Elective II				
1.	IMR2E1	Marketing Management		
2.	IMR2E2	Product Design and Manufacturing		
3.	IMR2E3	Customer Relationship Management		
4.	IMR2E4	Industrial Marketing		

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMR1C1	L	T	P	L	T	P	Total
PRODUCTIVITY AND TECHNOLOGY MANAGEMENT.	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites: To impart the basics of Productivity Concepts, to refine the skills of Workplace design through Work Study, Job Evaluation, etc. To develop the skills of Technology management through different technology transfer.

COURSE CONTENTS

UNIT-1

Productivity:

Productivity, Introduction, types of productivity, methods to improve productivity. Introduction to work study, method study, definition, importance, selection, recording, different recording techniques, principal of motion economy.

UNIT-2

Work Measurement:

Introduction to work measurement, time study, Steps in time study. Various techniques to measure time, slandered time, normal time, observed time. Allowances, measurement & significance. Work sampling, introduction & importance

UNIT-3

Job Evaluation:

Job evaluation and merit rating, introduction to job evaluation, various method of job evaluation, importance of job evaluation.

UNIT-4

Technology Management: Introduction to technology, technology management, importance of technology management, know how of technology, know why of technology, dimensions of technology management Technology life cycle, syndication diffusion.

UNIT-5

Technology Transfer

Technology forecasting, introduction, importance, absorption & adoption, generation of technology, method of technology transfer, technology transfer modes, technology diffusion, importance. Technology requirement for India, strategies for the companies in the changing environment. Case studies.

BOOKS RECOMMENDED:

- [1] Dhawan, *Productivity and Technology Management*. 2002
- [2] I.L.O, *Work Study*. 2004
- [3] Branes K.M, *Time & Motion Study*.
- [4] Farland Mc, *Management –Principal and Practice*. Dec 1990
- [5] Dr. Sushil, *Technology Management*. New Delhi Vikas, 2001

LABORATORY EXPERIMENTS:

- Study and analysis of Different productivity Measures related to specific industries.
- Study and analysis of different Recoding techniques for a given process.
- Estimation of Standard Time for a given Job, Process and its comparison with relevant industry data.
- Study and Analysis of Job Evaluation process and its comparison with related industry.
- Study of Technology Transfer process with special cases of industries or service organisation.
- Study of Technology Forecasting methods and their applications in Indian context.
- Case studies.

Course outcomes

After completing the course the student will be able to

:

- Can perform analysis of Different productivity Measures related to specific industries.
- Having the practical approach towards analysis of different Recoding techniques for a given process.
- Can make Estimation of Standard Time for a given Job, Process and its comparison with relevant industry data.
- Go in to deep and can make analysis of Job Evaluation process and its comparison with related industry.
- Having knowledge of technology transfer process with special cases of industries or service organisation.
- Learn about various Forecasting methods and their applications in Indian context.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time				
Subject Code & Name		Instructions Hours per Week		Credits				
IMR1C2		L	T	P	L	T	P	Total
QUANTITATIVE TECHNIQUES FOR MANAGEMENT		3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites: To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming, Transportation, Assignment, Queuing etc. Strategies formulation with the help of game theory and simulation etc.

COURSE CONTENTS

UNIT-1

Introduction:

History and development of O.R Present Trend.

Linear Programming:

Formulation, graphical methods, simplex method, Big- M- method, two phase method, degeneracy unrestricted variables. Quality in L p. revised simplex, duality, sensitivity analysis.

UNIT-2

3. Assignment Models: Formulation, Balanced and Unbalanced problems. **II Transportation:** Formulation, graphical methods

III Introduction to Integer Programming.

UNIT-3

Waiting Line Models:

Introduction, classification, state in queue, probability distribution of arrival and service times. Single server model (M/M/I). Multiple server model (MMS). Birth & death process.

UNIT-4

Game Theory & Simulation: Rectangular, two persons, zero sum games, maximin and minimax Principles. Saddle point. Dominic. graphical and algebraic method of solution by

transforming into linear programming problem. Bidding problem. Building a simulation model, Monte-Carlo simulation and application.

UNIT-5

Dynamic Programming: Introduction, developing optimal decision policy.

Replacement and Maintenance Models: Introduction, Individual replacement and group replacement policy.

BOOKS RECOMMENDED:

- [1] Taha, *Operations Research*, Tata Mc.Graw Hill.
- [2] Wagner, *Operations Research*, PHI. New Delhi, 2003
- [3] Ravindram & Philips, *Operations Research*, Tata Mc.Graw Hill.
- [4] Gupta & Hira, *Operations Research*, S. Chand. 1e, 2008
- [5] Chittle & Negi, *Operations Research*, Jain Brothers.
- [6] Vohra N.D, Kataria S.K, *Quantitative Techniques for Management*. Tata Mc.Graw Hill, 2004.

Course outcomes

After completing the course the student will be able to

- Having knowledge of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming, Transportation, Assignment, Queuing etc. Strategies formulation with the help of game theory and simulation etc.
- Learn the process of development, formulation and analysis of Linear Programming Problem for given decision making situations.
- Development and Analysis of Transportation and Assignment models.
- Learn the Development, Formulation and Analysis of Inventory problem for a given system.
- Able to model Queuing situations at a given service problems.
- Perform various Simulations exercise relating various operations research problems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMR1C3	L	T	P	L	T	P	Total
PRODUCTION AND OPERATIONS MANAGEMENT	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: To inbuilt the foundation of different Operations strategies like Aggregate planning, Plant location decisions, capacity planning. To ensure the development of skills required for new product development their production planning & control.

COURSE CONTENTS

UNIT-1

Introduction:

Overview of operation management, nature & content of operation management, various schools of management thought, framework for managing operations strategy & competitiveness, strategic planning for production & operations.

UNIT-2

Product Design:

Product / service and process design, product development, morphology of design process , product life cycle concept need identification, conceptual design , creative design concepts , feasibility study, Preliminary design , detailed design , design for customer, for manufacturer and assembly , types of processes, process planning and selection process flow structure , product / process matrix , technologies in manufacturing , FMS and CIM.

UNIT-3

Operation Capacity Planning:

Operation capacity planning , design and system capacity , capacity planning models , economic analysis capital budgeting and analysis , capital investment evaluation techniques, facility location and layout, foreign locations , factory affecting location decisions , models , analysis and selection of layouts , cellular manufacturing layouts.

UNIT-4

Production Planning & Control:

Functions of production planning and control, forecasting, qualitative and quantitative models for forecasting, accuracy of forecasting and selection of forecasting technique, aggregate planning, master production scheduling and MRP, operations scheduling, loading sequencing detailed scheduling and expediting, forward and backward scheduling, optimized production technology (OPT).

UNIT-5

Modern operations Techniques:

Overview of synchronous manufacturing and theory of constraints, introduction to Japanese contribution for WCM overview, JIT purchasing, KANBAN, KAIZEN concepts, modern trends in operations management, introduction to lean and agile manufacturing.

BOOKS RECOMMENDED:

- [1] Chase, Aquilino & Jacobs, *Production & Operations management*. Tata Mc.Graw Hill
- [2] Dilworth, *Production & Operations management*. 1999
- [3] Adams & Ebert, *Production & Operations management*. 1999
- [4] Monks, *Operations Management*. . Tata McGraw Hill, 1985

LABORATORY EXPERIMENTS:

- Study and analysis of Production planning & Control situations in industry.
- Study and analysis of various Forecasting Models.
- Development and analysis of Aggregate Planning Models.
- Development and Analysis of material requirement planning for the given data.
- Study and analysis of production Scheduling.
- Case studies related to production & Operations Management(manufacturing Sector).
- Case studies related to production & Operations Management(Service Sector).

Course outcomes

After completing the course the student will be able to:

- Analysis of Production planning & Control situations in industry. Understand and make analysis of various Forecasting Models. Learn about Aggregate Planning Models. Can make a practical approach towards material requirement planning for the given data.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMRIGI							
PRINCIPLES & PRACTICES OF MANAGEMENT	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Management Functions.

COURSE CONTENTS

UNIT-1

The Nature of Management:

Definition and role of management, the function of a manager, scientific management. Various schools of management thought.

UNIT-2

Planning:

Nature and purpose of planning, components of planning objective of business, forecasting, decision making, policy formulation and strategies. Management by objectives.

UNIT-3

Organization:

Nature and purpose of organizing structure, centralization, decentralization, span of control, delegation of authority relationship. Shaping the overall structure, formal and informal organization.

UNIT-4

Directions & Staffing:

Direction process, theories of motivation and leadership, need analysis, communication. Role and function of personal management, manpower planning, selection and recruitment, interviewing, training methods, welfare techniques.

UNIT-5

Control:

Meaning and process of control techniques of control evaluation, developing and compensating the employees, merit rating. Comparison of American, Japanese and Indian philosophies of management.

BOOKS RECOMMENDED:

- [1] Koontz and O'Donnell, *Essentials of Management* .Mc.Graw-Hill, Jan 1986.
- [2] Terry G.R, *Principals of Management*.
- [3] Peter Drucker, *Practice of Management*. 1992.
- [4] Farland Mc, *Management, Principal and Practice*.
- [5] Prasad L.M, *Principal and Practice & Mgt*.Sulatan Chand & Sons.

Course outcomes**After completing the course the student will able to:**

- Learn various Scientific management process
- Learn various schools of management thought.
- Get a deep knowledge of training methods, manpower planning, selection and recruitment, interviewing, welfare techniques.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E.(Industrial Engineering and Management) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR1E1 STATISTICAL QUALITY CONTROL AND TQM	3	1	1	3	1	1	5
Duration of Theory Paper: 3. Hours							

Objective and Pre requisites: To develop the skills required for Quality consciousness among the students. Basics of Quality control through different techniques like theory of Control charts & Acceptance sampling. To build the knowledge base of Total Quality Management, Six Sigma etc.

COURSE CONTENTS

UNIT-1

Quality Control:

Definitions, place of quality control in industries, quality control organization, difference between inspection and quality control, application of quality control in industries, economic of quality systems, quality assurance. Theory of Control Charts Sample size and frequency of sampling, out control, control for variables and attributes and their application design of X and R charts, Process capability studies.

UNIT-2

Acceptance Sampling: Single sampling planes, double sampling & sequential sampling planes, rectifying inspection for lots, sampling planes for continues production, selection of sampling planes for different situation, economics of acceptance sampling.

UNIT-3

Total Quality Management (TQM):

Evolution of total quality management , historical perspective, elements of TQM - Total employee involvement , elimination of waste and problem exposure , total quality control systems , Deming's wheel , Deming's 14 points – pros and cons in industrial engineering context , Philip Crosby philosophy , Juran philosophy , Ishikwa diagram , Just – in- Tinme philosophy design and development strategy in TQM – Quality function deployment.

Application of TQM to service type organization, service guarantees, case studies on application of TQM to services type organization, various quality award, cost benefit analysis, life cycle costing.

UNIT-4

Reliability:Distributions encountered in controlling reliability mean time to failure , exponential failure density, MTTF, Weibull, failure density, measurement and tests , maintenance and reliability , life testing.

UNIT-5 Concepts & Application of 6 – Sigma Quality:

Comparison between 3-sigma & 6- sigma quality relationship between DPMO and standard normal variate , short term and long term yield cost and quality effectiveness of 6- sigma strategy , DMAIC approach to 6-sigma implementation application to service industry link between 6-sigma & DOE. ISO 9000 Series and SPC, Quality Circles

BOOKS RECOMMENDED:

- [1] Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons, 2001.
- [2] Mitra A., *Quality Control Applications*, Pearson Education. 2e, 1998
- [3] Sharma D. D, *Total Quality Management*, Sultan Chand & Sons. New Delhi, 2000
- [4] Basterfield, *Total Quality Management*, Pearson Education, 2003
- [5] Logothitis, *Total Quality Management*, PHI.

LABORATORY EXPERIMENTS:

- Study and Analysis of set parameters relating to different mathematical distributions (Variable).
- Study and Analysis of set parameters relating to different mathematical distributions (Discrete).
- Construction & analysis of various process control charts.
- Performance of Acceptance Sampling for a given set of lots.
- Analysis of tools of related to total Quality Management like QFD, Fish bone diagram etc.
- Case studies related to subject.

Course outcomes

After completing the course the student will able to:

Able to perform analysis of set parameters relating to different mathematical distributions (Variable).

Learn different mathematical distributions (Discrete) methods.

Learn about Construction & analysis of various process control charts.

Analyse the performance of Acceptance Sampling for a given set of lots.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E.(Industrial Engineering and Management) Full Time				
Subject Code & Name	Instructions Hours per Week						Credits
	L	T	P	L	T	P	Total
IMR1G2							
HUMAN RESOURCE MANAGEMENT	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices at international level.

COURSE CONTENTS

UNIT-1

HRM Concept

Definition, Concept, Evaluation and Relevance of HRM. Human Resource Functions, HRM in Indian and Global Scenario. Human Resource Policies.

UNIT-2

Human Resource Acquisition Process

Job Analysis - Job Specification, Job Analysis Methods, Human Resource Planning Concept and Process of HRD, HRP Process at National and Corporate Level, Human Resource Information System. Steps of HRIS, Recruitment, Sources of recruitment, Selection, Stages in selection process. Global Scenario in HR Acquisition

UNIT-3

Human Resource Training and Development.

Orientation, Training and Development Process and Methods, Need Assessment, Training Evaluation, Approaches and Types of Evaluation Instruments, Developing Effective Training Programmes, HRD mechanism, HRD for Organizational Effectiveness

UNIT-4

Appraising and Improving Performance

Basic Concepts Objectives and Process of Performance Appraisal Systems, Performance verses Potential Appraisal, Types of Employee Appraisal Systems, New Trends in Performance Appraisal Systems at Global level, Succession Planning, Career Planning and Assessment Centers.

UNIT-5

Maintenance of Human Resources:

Job Evaluation, Incentive and Reward System, Objectives and Major Phases of Compensation Management, Cross-national variation in reward structures. Knowledge & knowledge transfer, knowledge and situation cognition, Implications for knowledge transfer, knowledge management in multinational companies, knowledge management & International HRM.

BOOKS RECOMMENDED:

- [1] Bohlander, Human Resource Management, 14 th edition Cengage Learning, India, 2009
- [2] Dessler, Verckey, Human Resource Management, Pearson Education, 2009.
- [3] Monir H. Tayeb, International Human Resource Management, Oxford, 2009.
- [4] Patnaik, Human Resource Management, 3 rd edition, PHI, 2009.
- [5] Subba Rao, Essential of HRM and Industrial Relation, Himalaya Pub. House. 2008,

- [6] Subba Rao, International Human Resource Management, Himalaya Publishing House., 2009.
- [7] [7]. Jeffery Mello, Human Resource Management, Cengage Learning, India, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMR1G3	L	T	P	L	T	P	Total
E- BUSINESS & COMMERCE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

UNIT – 1

Introduction

Fundamentals in E-Commence – Meaning, Nature, Limitation, E – Commerce – Origin, Nature, Meaning, Definitions, Features, Need , Advantages & Disadvantages, Essential requirements, e – Commerce Vs Traditional Commerce.

UNIT – 2

Business Models for e Commerce

e-Business: Meaning, Definition, Importance, e Business models based on the Relationships of transaction parties, B2C, B2B, C2C, C2B. e Business models based on the relationship of transaction types – Manufacture Model, Advertising Model, Value Chain Model, Brokerage Model.

UNIT – 3

E –Payment Systems:

Modes of e Payment – Credit Cards, Debit Cards, Smart Cards, e Credit Accounts, e Money/Cash, Digital Signatures – Legal Positions of Digital Signatures, How Digital Signature Technology Works, Risks & e Payment system : Data protection, risk from mistakes & disputes – Consumer protection, Management Information Privacy, Managing Credit Risk.

UNIT – 4

E-Business Communication

Introduction, Importance of e Technology in e Business Communication, Modes of e-Business communication, e- Business Communication, e – Business Conferencing – Audio, Document Telephone, Video Conferencing – Types Email in e Commence, Mobile Communication. E – Banking Introduction concept &

meaning, Electronic Fund Transfer – Automated Clearing house, Automated ledger posting, Electronic Money transfer e- Cheque, ATM, FOS, Tele banking.

UNIT – 5

E- Security & E- Markets

Introduction, Need for Security, Security concepts, attacking methods – Cyber crimes, Cryptology, Hacker, encryption. E-commerce security solutions – E – Locking Techniques, e-Locking product, e-Locking services, Net Scape security solution E-

Markets: On line shopping – On Line purchasing –Electronic Market –Three models of e-Markets, e-Advertising e- Branding.

BOOKS RECOMMENDED:

[1] Murthy C.S.V., e Commerce–Concepts Models Strategies Himalaya Publishing House 3e, 2005.

[2] Basics of e Commerce-Legal & Security issues ISBN 81-203-2432-3.

[3] Joseph P.T., e Commerce : An Indian Perspective, 2ndEd., SJ, 2006.

Course outcomes

After completing the course the student will able to:

- Learn about e – Commerce Vs Traditional Commerce
- Learn about Manufacture Model, Advertising Model, Value Chain Model, Brokerage Model.
- Learn the practical implementation of Advertising Model, Value Chain Model, Brokerage Model.
- Learn the features and practical implementation of e- Business Communication, e – Business Conferencing – Audio, Document Telephone,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR1E3 BUSINESS PROCESS RE-ENGINEERING	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: To provide a greater understanding of effective solutions to change problems that need to combine technological, organizational and people-orientated strategies by adopting a process based approach to change management. To introduce the contingencies that affect management and the most effective measures for dealing with them. To introduce strategic IS/IT planning and how it must relate to business strategy. To demonstrate the use and validity of organizational development models through current real-life case studies.

COURSE CONTENTS

UNIT-1

Business process reengineering-an overview:

Historical background Fundamentals of BPR Concepts and techniques. Changing business processes: the importance of technology as a driver for organization: Nature, significance and rationale of business process reengineering (BPR),

UNIT-II

Process redesign:

Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, measuring existing processes, Role of information technology (IT) and identifying IT levers.

UNIT-III

Designing and building a prototype of the new process:

BPR phases, Relationship between BPR phases. BPRE & TQM, benchmarking, ISO standards. Implementation of BPRE-business process management, principles, Business models, barriers.

UNIT-IV Change management:

Change and the manager: change and the human resource: the cultural web and the past: the cultural attributes of change Typical BPR activities within phases: Change management, Performance management, and programme management.

UNIT-VBPR and continuous improvement:Co-ordination and complementary efforts, IT capabilities and their organizational impacts, Implementation of BPR, Stages of implementation

and critical aspects, Case studies on BPR. The concept of the learning organization and its influence on systems development: restructuring the organization .The importance of communication and the resistance to change: building the culture for successful strategy implementation; the influence IT will have on the internal appearance of organizations in the future.

BOOKS RECOMMENDED:

- [1] 1.Omar El Sawy, Business Process Re-engineering, Tata McGraw Hill , 2010
- [2] 2.R. Srinivasan, Business Process Re-engineering, Tata McGraw Hill , 2011
- [3] 3.Warner Winslow, Strategic Business Process Transformation through BPR, , Tata McGraw Hill , 1996

LABORATORY EXPERIMENTS:

- Case studies related to Historical background Fundamentals of BPR Concepts and techniques.
- Case studies related to Major issues in process redesign:.
- Case studies related to Role of information technology (IT) and identifying IT levers.

- Case studies related to Designing and building a prototype of the new process.

- Case studies related Change management, Performance management, and programmed management.
- Case studies related to BPR and continuous improvement.
- Case studies related to concept of the learning organization, importance of communication and the resistance to change.

Course outcomes

After completing the course the student will able to:

- Learn about various Processes – Rational–Analytical, Intuitive-Emotional,
- Perform SWOT analysis .
- Know about the fact used for the practical implementation of Strategy alternatives.
- Learn Managerial Choice Factors, Choice Processes – Strategic Gap Analysis.
- How to make Strategy Implementation, Evaluations and Control.
- Learn the procedure related to Implementation; Control and Evaluation Process.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR1E2							
STRATEGIC MANAGEMENT	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives & Prerequisites:

The objective of teaching this course is to enable students to integrate knowledge of various functional areas and other aspects of management, required for perceiving opportunities and threats for an organization in the long-run and second generation planning and implementation of suitable contingency strategies for seizing / facing these opportunities & threats.

COURSE CONTENTS

UNIT-1

Introduction:

Meaning, Need and Process of Strategic Management; Business Policy, Corporate Planning and Strategic Management; Single and Multiple SBU organisations; Strategic Decision-Making Processes – Rational-Analytical, Intuitive-Emotional, Political – Behavioral;

UNIT-2

Objectives & Strategic Analysis:

Need, Formulation and changes in these three; Hierarchy of objectives, Specificity of Mission and Objectives. SWOT Analysis General, Industry and International Environmental Factors; Analysis of Environment, Environmental Threat and Opportunity Profile (ETOP) Strategic Advantage Profile (SAP).

UNIT-3

Strategy Alternatives:

Grand Strategies and their sub strategies; Stability, Expansion, Retrenchment and Combination; Internal and External Alternatives; Related and Unrelated Alternatives, Horizontal and Vertical Alternatives; Active and Passive Alternatives; International Strategy Variations

UNIT-4

Strategy Choice:

Making: Managerial Choice Factors, Choice Processes – Strategic Gap Analysis, ETOP-SAP Matching, BCG Product – Portfolio Matrix, G.E. Nine Cell Planning Grid; Prescriptions for choice of Business Strategy

UNIT-5

Strategy Implementation, Evaluations and Control:

Strategy Implementation, Evaluations and Control: Implementation Process; Resource Allocation; Organizational Implementation; Plan and Policy Implementation; Control and Evaluation Process; Criteria for Evaluation; Measuring Feedback; and Corrective Action.

BOOKS RECOMMENDED

- [1] Azhar Kazmi, Business Policy and Strategic Management, TMH, 2010
- [2] Fred David, Strategic Management Concepts and Cases, PHI, 12 Ed
- [3] Wheller and Hunger, Basic Concepts of Strategic Management, TMH, 12 Ed

LABORATORY EXPERIMENTS:

- Case studies related to Process of Strategic Management; Business Policy, Corporate Planning.
- Case studies related to Strategic Decision–Making Processes.
- Case studies related to Strategy alternatives.
- Case studies related to Making: Managerial Choice Factors, Choice Processes – Strategic Gap Analysis.
- Case studies related to Strategy Implementation, Evaluations and Control.
- Case studies related to Implementation; Control and Evaluation Process.

Course outcomes

After completing the course the student will able to:

- Learn about Historical background Fundamentals of BPR Concepts and techniques.
- Able to make analysis of Major issues in process redesign:.
- Adopt the fetures of information technology (IT) and identifying IT levers.
- Designing and building a prototype of the new process.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name IMR2C1 FINANCIAL MANAGEMENT	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives and Pre requisites: To inbuilt the concepts of Financial management. To strengthen skills related to Accounting. Application of financial tools and techniques, helpful for financial planning Capital Budgeting and Decision Making.

COURSE CONTENTS

UNIT-1

Nature and Scope of Financial Management:

Role of financial management in business decisions, goals of financial management, evolution of corporate finance, finance function, broader applicability of financial management concepts, tasks of finance controller.

UNIT-2

Book Keeping and Accounting:

Introduction of book keeping. Accounting Process & its concepts, Introduction & working knowledge of different books of account. Preparation of Financial Statements of the firm.

UNIT-3

Tools of Financial Analysis:

Funds flow analysis – sources and use of funds, balance sheet and profit and loss statements, measurement of cash flows, revenue cost, profit relationship, break even analysis, ratio analysis, analysis of operating and financial leverages, long term and short term cost out put relationship.

UNIT-4

Financial Planning:

Financial forecasting, forecasting techniques, criterion for investment decisions, dividend policy, cost of capital problems of financial planning and budgeting in public sector undertaking.

UNIT-5

Financial Budgeting:

Capital budgeting, capital budgeting, capital rationing, sources of rising fixed and working capital, management of working capital, internal financing, balanced capital structure,

BOOKS RECOMMENDED:

[1] Kuchchal, *Financial management*. Tata McGraw Hill, 2003

[2] Chandra Prasanna, *Financial management*. Tata Mc.Graw Hill, 2000

Course outcomes

After completing the course the student will able to:

- Practical implementation of Accounting Procedure and Book Keeping.
- How to prepare different Financial Statements.
- Make understating of Ratio Analysis.
- Learn the process of internal financing, balanced capital structure,
- .Financial forecasting, forecasting techniques
- Funds flow analysis – sources and use of funds, balance sheet and profit and loss statements.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time				
Subject Code & Name		Instructions Hours per Week			Credits			
IMR2C2 MATERIALS MANAGEMENT		L	T	P	L	T	P	Total
		3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours								

Objective and Pre requisites: To inbuilt the concepts of Material handling and purchase procedure of an organization. To impart the basics of standardization & stores management within an organization. To concrete the concepts of inventory management for effective decision making related to material & inventory.

COURSE CONTENTS

UNIT-1Introduction:

Objective of materials management, field and scope of material management, general analysis material quality, material planning programming.

UNIT-2

Standardization: Concepts and Procedure,
Simplification: Concepts and Procedure,
Codification: Concepts and Procedure.

UNIT-3Purchase Management:

Problems of purchasing , organization of purchasing Deptt, purchase procedures , placing of orders , inspection and testing , purchasing for mass production , purchase contract , make or buy decision , material import , DGS & D rate contract.

UNIT-4Stores Management:

Stores organization, methods of storing, record – keeping & checking, issue methods, stores layout.

UNIT-5Inventory Management:

Various inventory models, quantity discounts, shortages, instantaneous production with back orders, fixed time mode, single period model of profit maximization with time independent costs, lead time , re-order point , Buffer stock, models with price breaks, selective control of inventory, POQ system.

BOOKS RECOMMENDED:

- [1] Lee & Dobler, *Material management*. Tata Mc.Graw Hill, 1990
- [2] Arnold J.R Tony & Stephen N. Chapman, *Introduction to Material management*. 2003
- [3] Gopal Krishnan, *Material Management*.1992

LABORATORY EXPERIMENTS:

- Cases related to material handling problem in the plant or organization.
- Cases related to the problem of Standardization, simplification, codification.
- Cases related to Problems of purchasing.
- Cases related to inspection and testing, purchasing for mass production.
- Cases related to stores layout.
- Cases related to various inventory models.
- Determination of EOQ from the given data & its comparison with data of the industry.

Course outcomes

After completing the course the student will able to:

- Learn about field and scope of material management,
- Learn about Standardization: Concepts and Procedure,
- Simplification: Concepts and Procedure,
- Codification: Concepts and Procedure.
- Get deep knowledge of Problems of purchasing , organization of purchasing Deptt
- Stores organization, methods of storing, record –

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E (Industrial Engineering and Management) Full Time				
Subject Code & Name		Instructions Hours per Week			Credits			
IMR2C3 SUPPLY CHAIN MANAGEMENT		L	T	P	L	T	P	Total
		3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours								

Objectives and Pre requisites: To inbuilt the concepts of Logistics and supply chain Management. To strengthen skills related to supply chain strategies decisions.

COURSE CONTENTS

UNIT-1

Introduction to Supply chain:

Introduction to supply chain. Objective of supply chain, Process view of supply chain, Supply chain management, supply chain challenges, Supply Chain performance. Competitive and Supply chain strategies, achieving strategic fit, expanding strategies scope, Supply chain drives & obstacles: Frame work, inventory, transportation facilities, information, and obstacles to achieving fit.

UNIT- 2

Designing the Supply Chain Network:

Role of distribution in supply chain, factors influencing distribution network, design options, e – business and distribution network.

Network Design in supply chain: Role of network design, factors influencing, framework for network design decision, role of IT.

UNIT-3

Sourcing decision in Supply chain

Role of sourcing, supplier scoring, design collaboration, sourcing planning and analysis, role of IT in sourcing, Risk management, in sourcing, design collaboration, making sourcing decisions in practice

UNIT-4

Transportation in supply chain

Transportation in supply chain: Factors affecting transportation decision , modes of transportation & their performance characteristics , design options , tradeoffs , tailor transportation , routing & scheduling in Transportation , Network design in supply

chain : Factors affecting network designing decisions, frame work, models , information technology in supply chain

UNIT-5

Supply chain coordination and Information technology

Understanding lack of coordination and Bullwhip effect, obstacle to coordination in supply chain, managerial levers to achieve coordination, building strategic partnership, collaborative planning, forecasting, achieving coordination in practice.

Role of IT in supply chain, supply chain IT frame work, supply chain IT in practice

BOOKS RECOMMENDED:

[1] Finkelstein & Guertin, Integrated logistics support, IFS publication U.K., 1988

[2] Copra Sunil & Meindl Peter, Supply chain management. McGraw-Hill, 1998.

[3] Mentzer, Supply chain management. . Sage Publications, 2004

[4] Chistofer M., Logistics & supply chain management. 1998.

LABORATORY EXPERIMENTS:

- Case studies related to operation and systems logistics.
- Case studies related to Logistics in system utilization and support
- Case studies related to integrated logistic support.
- Case studies related to Competitive and Supply chain strategies.
- Case studies related to Factors affecting transportation decision.
- (6) Case studies related to Network design in supply chain.

Course outcomes

After completing the course the student will able to:

- Learn the concept of supply chain, Supply chain management, supply chain challenges
- Understand various Risk management, in sourcing, design collaboration, making sourcing decisions in practice
- Learn the procedure of routing & scheduling in Transportation
- Learn the drawbacks of lack of coordination and Bullwhip effect
- Learn about supply chain IT in practice

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR2G1 PROJECT MANAGEMENT							
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: To develop the Knowledge & concepts of Project Management. To develop the of Project's Analysis on different criteria like Market potential, Technical & Financial Analysis. To develop the skills of Project Appraisal through different criteria.

COURSE CONTENTS

UNIT-1

Project Management:

Definition characteristics and life cycle, difference with operation s management, steps in PM, projects managers jobs organization for PM, critical chain concepts.

UNIT-2

Market Potentiality & Technical Analysis:

Identification of opportunities of new products.

Materials and input production technology, product mix, plant capacity, project planning and analysis tools.

UNIT-3

Financial Analysis:

Estimation of cost of project, means of finance, estimate of working capital, estimate of cost of production, working result & profitability, projected balance sheet and projected cash flow statements. Project Appraisal Criteria: Payback period, net present value methods, cost benefit analysis, internal rate of return.

UNIT-4

Project Management through Network:

Work break down structure, Gantt chart etc. PERT: - Activity average time variance and project completion time by normal distribution. CPM: - Critical path, floats their interpretation, event occurrence time, slacks, resource allocation, crashing of NW, time cost trade-off, resource smoothing and leveling.

UNIT-5

Monitoring and Control:

Features of control, project control, performance analysis and cost control curves, line of balance, GERT, computer applications.

BOOKS RECOMMENDED:

[1] Chandra Prasanna, *Project preparation*, Tata Mc.Graw Hill publishing CO. 1, New Delhi

[2] Jain D.K, *Project planning and appraisal in planned economy*, Uppal publishing house, New Delhi.

[3] Lock Dennis, *Project management*, Galgotia book service, New Delhi.

[4] Mohsin M., *Project planning and control* Vikas publishing house, New Delhi.

[5] Sonha A.K and Sinha Ram, *project engineering and management*, Vikas publishing house, New Delhi.

LABORATORY EXPERIMENTS:

- Case studies related to different types of project and their characteristics.
- Case studies related to responsibilities of project manager related with different projects .
- Case studies related to market potentiality analysis with reference to new product.
- Case studies related to technical analysis with reference to different projects.
- Case studies related to financial analysis with reference to new product.
- Case studies related to project implementation techniques.
- Case studies related to project control techniques.

Course outcomes

After completing the course the student will able to:

- Will able to make performance analysis and cost control curves
- With critical chain concepts.
- Learn about various Materials and input production technology
- Learn about Payback period, net present value methods,
- Work break down structure, Gantt chart etc. PERT:

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E.(Industrial Engineering and Management) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR2G2 ENTERPRISE RESOURCE PLANNING	3	1	1	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Prerequisites: To impart the basics of Enterprise Resource Planning (ERP) & its implementation methodologies to the students

COURSE CONTENTS

Unit - 1

Introduction:

ERP: an over view, Benefits of ERP, REP and related technologies, Business Process Reengineering, Data warehousing, Data Mining, Online Analytical processing (OLAP), Supply Chain Management.

Unit – 2

ERP Implementation:

ERP implementation Life cycle, Implementation Methodology, Not all packages are created equal, ERP Implementation Hidden Costs, Organizing the implementation, Vendors, Consultants and Employees.

Unit – 3

The Business Modules:

Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales & Distribution.

Unit – 4

The ERP Market:

ERP Market place, SAP AG, PeopleSoft, Bann Company, Oracle Corporation. QAD, System Software Associates, Inc. (SSA).

Unit - 5

ERP – Present & Future:

Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E – Commerce, ERP & Internet, Future Directions in ERP.

BOOKS RECOMMENDED:

- [1] Leon Alexis, ERP Demystified, Tata McGraw – Hill, 1e,2004.
- [2] Garg V.K. & N.K. Venkitakrishnan ERP Ware: ERP Implementaion Framework, PHI, 4e,2004.
- [3] Leon Alexis, ERP Concepts and Planning, Tata Mcgraw – Hill,1e,2000.

Course outcomes**After completing the course the student will able to:**

- Learn About Supply Chain Management.
- Having deep knowledge of Date warehousing, Data Mining
- Learn the process of ERP implementation Life cycle
- Make a practical implementation of Business Modules using ERP Package
- Learn about practical implementation of various SAP AG, PeopleSoft, Bann Company, Orcale Corporation.
- Learn about Internet, Future Directions in ERP.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR2E1 MARKETING MANAGEMENT	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: To build a strong foundation of Marketing concepts & to acquaint the students about the different Marketing Functions. To develop the skills of Marketing Strategies formulation & its implementation in an organization to maximize profits and improvement of Brand Image.

COURSE CONTENTS

UNIT-1

Introduction:

Tasks and philosophies of marketing MANAGEMENT, the marketing system and environment, system and environment, system approach to marketing. Marketing Organization, Organization of marketing department, responsibilities and functions of marketing managers, interaction of marketing in other functions.

UNIT-2

Marketing Research:

Scope and objective, planning and formulating marketing research projects, methods of collecting data, analysis and evolution of data, consumer behavior analysis, vendor analysis.

UNIT-3

Product Planning:

Product policy decision, life cycle innovation, product failure, introduction new products, product mix strategies, product portfolios management ,BCG GF-directional matrices, planning & budgeting for establishing and new products-MARMIX model.

UNIT-4

Sales Promotion and Advertising: Role of promotion and advertising, type of promotion and advertising method, promotion and advertising appropriation, development and evaluation of advertising program.

UNIT-5

Distribution & Sales Function:

Importance of middlemen, types of distribution channel, channel design decisions, problems in channel determination and uses. Recruitment, selection, training, motivation and compensation of sales force, controlling and evaluating.

BOOKS RECOMMENDED:

- [1] Kotler Philip, *Marketing management, planning, analysis and control*. PHI, 2001
[2] Cundiff, Still & Govoni, PHI. , 2003

Course outcomes

After completing the course the student will able to:

- Learn about different philosophies of marketing concepts.
- Learn the Importance of middlemen, types of distribution channel, different marketing organizations.
- Having knowledge of marketing research approaches adopted by business organisation.
- Case studies related to product development and planning by different organisation.
- Case studies related to sales promotion and advertising practices of different organisation product portfolios management ,BCG GF-directional matrices, planning.
- Learn about sales promotions practices of different organisation.
- Able to make Product policy decision.
- Learn about life cycle innovation and product failure,.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMR2E2 PRODUCT DESIGN & MANUFACTURING Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Objectives & Pre requisites : To impart the basics of Product Design & Development of a new Product. To sharpen the skills of the students to understand the different manufacturing processes/ systems for new product development.

COURSE CONTENTS

UNIT -1

Introduction

Characteristics of successful product development, Design and development of products, duration and cost of product development, the challenges of product development. Development Processes and Organizations: A generic development process, concept development: the front-end process, adopting the generic product development process, the AMF development process, product development organizations, the AMF organization.

UNIT -2

Product Planning

The product planning process, identify opportunities. Evaluate and prioritize projects, allocate resources and plan timing, complete pre project planning, reflect all the results and the process.

UNIT - 3

Identifying Customer Needs

Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process. Product Specifications: What are specifications, when are specifications established, establishing target specifications, setting the final specifications.

UNIT - 4

Concept Generation

The activity of concept generation clarify the problem, search externally, search internally, explore systematically, and reflect on the results and the process. Concept Selection: Overview of methodology, concept screening, and concept scoring, Concept Testing: Define the purpose of concept test, choose a survey population, choose a survey format, communicate the concept, measure customer response, interpret the results.

UNIT – 5

Design for Manufacturing

Definition, estimation of manufacturing cost, reducing the cost of components, assembly, supporting production, impact of DFM on other factors. Prototyping: Prototyping basics, principles of prototyping, technologies, planning for prototypes. Product Development Economics: Elements of economic analysis, base case financial mode, Sensitive analysis, project trade-offs, influence of qualitative factors on project success, qualitative analysis.

BOOKS RECOMMENDED:

- [1] Ulrich Karl.T. & Eppinger Steven D., “Product Design and Development” Irwin McGrawHill- 3e, 2000.
- [2] Chitale A. C. and Gupta R. C., PH1, “Product Design and Manufacturing”, 3e, 2003.
- [3] Timjones Butterworth Heinmann, “New Product Development” Oxford. UCI. 1997.
- [4] Boothroyd G., Dewhurst P. and Knight W., “Product Design forManufacture and ssembly”,

Course outcomes

After completing the course the student will able to:

- Learn about Characteristics of successful product development, Design and development of products.
- Prctical knowledge of Development Processes and Organizations.
- Learn how to make the product planning process, identify opportunities.
- Well understanding of Customer Needs.
- Perform Sensitive analysis, project trade-offs.
- Sensitive analysis, project trade-offs.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Full time			
Subject Code & Name IMR2E4 INDUSTRIAL MARKETING	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: The objective of this course is to help the students develop an understanding of the dimensions of the Marketing, with particular reference to Industrial reference and practices at national and international level.

COURSE CONTENTS

UNIT-1

Nature of Industrial Marketing
Industrial Marketing Vs. Consumer Marketing , Relational approach to Industrial Marketing- The Nature of Industrial Demand & Industrial Customer

UNIT-2

Types of Industrial Products Major Equipment; Accessory Equipment; Raw and Processed Materials; Component Parts and Sub- Assemblies; Operating Supplies; Standardized and Non-standardized parts, Industrial services

UNIT-3

Organizational Buying Factors influencing Organizational Buying, Buying Roles; Organizational Buying Decision Process; environmental & organizational Influences, Organizational Influences on Buying Behavior: Buying Roles; The Buy Grid Model; The Organizational Buying Decision Process

UNIT-4

Industrial Product Decisions Industrial Product Life Cycle, Industrial Product Mix determinants viz. technology, competition, operating capacity, shift in location of customers, government controls, changes in level of business activity, Channel Structure for Industrial Products,
Geographical, size, operating characteristics manufacturers' and sales agents Brokers Channel Logistics
Purchasing systems – Auctions- Documentation bids order placement follow up receipt and inspection

UNIT-5 Pricing & Promotion for Industrial Products Pricing Objectives ,Price Decision Analysis , Breakeven analysis, net pricing, discount pricing , trade discounts, geographic pricing , factory pricing , freight allowance pricing ,Terms of Sale, Outright purchase , Hire-purchase , Leasing Promotion for Industrial products , Supporting salesman , Motivating distributors , Stimulating primary demand , Sales appeal , Publicity & sponsorships , Trade shows, exhibits , Catalogs, Samples promotional letters – Promotional novelties

BOOKS RECOMMENDED:

- [1] 1 Ralph S. Alexander, James S. Cross [and] Richard M. Hill., Industrial marketing - 3d ed. Homewood,
- [2] Reeder, Robert R., Brierty, Edward G. and Reeder, Betty H, Industrial Marketing Analysis, Planning and Control. Publisher: Prentice Hall ,1991.
- [3] P K Ghosh **Industrial Marketing** Oxford University Press India 2005
- [4] Havaldar, Krishna **Industrial Marketing**, Tata McGraw-Hill 2010
- [5] C S G Krishnamacharyulu, Lalitha R , **Industrial Marketing** , Jaico Publishing House,

Course outcomes

After completing the course the student will able to:

- Get deep knowledge of CRM as a business strategy.
- Learn about Dynamics of Customer Supplier Relationships.
- Make study on various aspects related to Marketing Aspects of CRM.
- Learn about Relationship data management.
- Learn about Contact Management, Campaign Management,
- Sales Force Automation.
- Case studies related to CRM implementation.

M.E Mechanical Engineering (Design & Thermal) (Full Time)
Proposed Scheme for CBCS

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit	Sub Type
1.	DTR1C1	Tribology	3-1-1	PC1
2.	DTR1C2	Design of Internal Combustion Engine Systems	3-1-1	PC2
3.	DTR1C3	Advanced Machine Design	3-1-1	PC3
4.	DTR1GX	Generic Elective I	3-1-0	GE1
5.	DTR1EX	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	DTR1W1	Seminar/ Res. Tool/Work Shop-1	0-2-0	
8.	DTR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I				
1.	DTR1G1	Advanced Thermodynamics		
2.	DTR1G2	Non Conventional Energy Systems		
3.	DTR1G3	Management Information System		
4.	DTR1G4	Finite Element Analysis		
List of Elective I				
1.	DTR1E1	Advanced Mechanics of Solids		
2.	DTR1E2	Fatigue Creep and Fracture		
3.	DTR1E3	Mechanism and Robot Kinematics		
4.	DTR1E4	Thermal Systems : Simulation and Design		
SEM II				
1.	DTR2C1	Machinery Fault Diagnosis and Signal Processing	3-1-1 =5	PC4
2.	DTR2C2	Advanced Refrigeration and Air Conditioning	3-1-1 =5	PC5
3.	DTR2C3	Computer Aided Modeling and Simulation	3-1-1 =5	PC6
4.	DTR2Gx	Generic Elective II	3-1-0 =4	GE2
5.	DTR2Ex	Elective II	3-1-1 =5	PE2
6.	ASR2S2	Soft Skills -2	2-0-0 =2	
7.	DTR2W2	Seminar/ Res. Tool/Work Shop-2	0-2-0=2	
8.	DTR2V2	Comprehensive Viva II	0-0-4=4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II				
1.	DTR2G1	Advanced Heat Transfer		
2.	DTR2G2	Rapid Prototyping		
3.	DTR2G3	Cogeneration and Waste Heat Recovery		
4.	DTR2G4	Mechatronics in Manufacturing Systems		
List of Elective II				
1.	DTR2E1	Machine Vibrations Analysis		
2.	DTR2E2	Experimental Stress Analysis		
3.	DTR2E3	Applied Elasticity and Plasticity		
4.	DTR2E4	Automotive Systems: Analysis and Design		

Devi Ahilya University, Indore, India Institute of Engineering & Technology			M.E.(Design & Thermal) Semester A Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTR1C1 Tribology	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are material science and machine design.

UNIT- 1

Fundamentals of Tribology:

Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques.

UNIT- 2

Friction:

Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods.

UNIT- 3

Wear:

Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-4

Lubrication:

Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizures, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring.

UNIT- 5

Design for Tribological Elements:

An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication, Design of hydrodynamically loaded journal bearing, externally pressurized bearing, rolling element bearing, performance analysis of bearing.

BOOKS RECOMMENDED

- [1] Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975
- [2] Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- [3] Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982 [4]Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999

COURSE OUTCOMES:

The knowledge of the subject and fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are material science and machine design.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1C2	L	T	P	L	T	P	Total
Design of Internal Combustion Engine Systems	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To impart the knowledge of Internal combustion engine from systems design perspective.

Pre requisites: Fundamentals of thermodynamics, Combustion process, Theory of Internal combustion Engines

UNIT-1

Genesis

Evolution: Limitation of Steam Engines, Hot Air Engine, Internal Combustion Engines, Atmospheric Engines, Lenoir Engines, Otto-Langen Engine; Engine Cycles; Flow chart of typical Internal Combustion engine processes; Classification; Configurations; Operational and performance parameters; Fuels for engines: composition, characteristics.

UNIT-2

Induction and Exhaustion Systems

Gas exchange; Intake system: Air-filter, Carburetor, Injectors: throttle body, port, direct injection; Diesel Injection: Low and High pressure Common Rail Systems, Jerk pump systems, Electronically controlled; Manifolds; Superchargers and turbochargers; Exhaust Systems; Exhaust manifold, Exhaust Pipe, Catalytic Converter, Muffler; Valves Flows:Flow Patterns, Discharge Coefficient, Performance, Timing and its Effects; Scavenging: Performance parameters; Volumetric Efficiency.

UNIT-3

In-cylinder flows and Combustion Thermochemistry

In-cylinder flows: Measurement; Swirl: Induction Swirl, Swirl Coefficient, Swirl Ratio; Swish; Tumble; Squish; Prechamber flows;Stoichiometry Relations: Air required for Complete Combustion based on Fuels, Incomplete Combustion, Calculation of Dry Flue Gases for known fuel composition, Estimating Fuel Composition and Excess Air quantity from Exhaust Gas Analysis, Flue Gas Analysis (O₂, CO₂, CO, NO_x, SO_x); Combustion Terminology: Adiabatic Flame temperature, Combustion Rates, Equilibrium Coefficient, First Law applied to Chemical Reactions Combustion Efficiency.

UNIT-4

IC Engines Sub Systems

Starting and Charging systems; Ignition Systems; Engine Heat transfer and Cooling systems; Engine friction and lubrication systems; Mechanisms for system operations.

UNIT-5

Pollutant Formation and Control

Emission Formation in SI Engines: Constituents, Formation Mechanisms: Hydrocarbon, Carbon Monoxide, Oxides of Nitrogen, Carbon dioxide, Aldehydes; Control Techniques; Fuel Injection Technologies, Heated Oxygen Sensors, Emission formation in CI Engines: Constituents, formation Mechanisms: Carbon Monoxide, Unburned Hydrocarbons, Oxides of Nitrogen, Compounds of Sulphur, Particulate Matter, Control Techniques: Fuel Injection Technology, Electronically Controlled Distribution, Electronic Unit injector System, After Treatment Devices.

Text Books:

- [1] Engineering Fundamentals of internal Combustion Engines, Willard W. Pulkrabek, Printice Hall New Jersey.
- [2] Internal Combustion Engine Fundamentals, John B Heywood, McGraw-Hill Book Company, New York, 1988.
- [3] Internal Combustion Engines Applied Thermosciences, Colin R. Ferguson and Allan T. Kirkpatrick, John Wiley & Sons, 2e, 2004
- [4] Internal Combustion Engines, V. Ganesan, Tata McGraw-Hill, New-Delhi, 1990
- [5] An Introduction to Combustion: Concept and Applications, Stephen R. Turns, McGraw-Hill Education (India), New-Delhi, 2011

List of Experiments

- Study of various IC engine Components and Sub-systems.
- Study of Induction and Exhaustion Systems
- Study of Ignition Systems, Cooling systems, lubrication systems for IC engine systems
- Simulation and Modeling of Spark Ignition engines
- 4.Simulation and Modeling of Compression Ignition engines
- Emission measurement in Spark Ignition and Compression Ignition Engines.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO HAVE

The knowledge of Internal combustion engine from systems design perspective.

Fundamentals of thermodynamics, Combustion process, Theory of Internal combustion Engines

Devi Ahilya University, Indore, India Institute of Engineering & Technology			M.E.(Design & Thermal) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1C3	L	T	P	L	T	P	Total
Advanced Machine Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: The objective of the subject is to deal with failure analysis and advanced areas of design of machine elements based on reliability, fatigue, creep. Also deals with the fracture mechanics approach to design.

Prerequisite(s): Pre requisites are Material science, Machine Design I and Machine Design II.

COURSE OF CONTENTS

Unit-I

Introduction to Advanced Mechanical Engineering Design:

Review of materials and processes for machine elements. Case studies of mechanical engineering design failures. Review of static strength failure analysis – theories of failure.

Unit-II

Reliability and Optimum based Design :

Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability, System concept in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

Unit-III

Design for Dynamic Loading:

High cycle and low cycle fatigue, Fatigue strength. Design of Mechanical Equipment Elements. Exercises of fatigue design of shafting and gears. Exercises of surface fatigue design of rolling contact bearings including linear bearings.

Unit-IV

Design for Creep:

Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

Unit-V

Fracture mechanics:

Introduction: Fracture mechanics approach to design, the energy criterion, the stress intensity approach, effect of material properties on fracture, dimensional analysis in fracture mechanics. Fundamental concepts: Stress concentration effect of flaws, the Griffith energy balance, the energy release rate, instability and the R curve, stress analysis of cracks, K as a failure criterion. Fracture toughness testing of metals

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Text Books:

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003
- [2] Dieter G.E., *Engineering Design*, McGraw-Hill 2000.
- [3] Mubeen., *Machine Design*, , Khanna Publications(P) Ltd.,2004

COURSE OUTCOMES:

The failure analysis and advanced areas of design of machine elements based on reliability, fatigue, creep. Also deals with the fracture mechanics approach to design.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR1E1	L	T	P		L	T	P	Total
Advanced Mechanics of Solids	3	1	2		3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives:

- To develop the analytical methods for solving problems in mechanics of solid those are generally considered beyond the scope of basic course in the discipline. As such, the developments tend to evolve from fundamentals principles such as equilibrium and conservation of energy.
- To understand fundamentals of linear elasticity and energy methods for solving torsion, bending problems.
- To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures using Finite Element Analysis
- Prerequisites: Mechanics of Solids

COURSE OF CONTENTS

Unit-1

3D Analysis of Stresses and strains

Concept of stress at a point, stress tensor, stress on inclined plane, stress components on a rectangular parallelepiped in Cartesian coordinate system, derivation of stress equilibrium equations, transformation of stresses, strains. The state of strain at a point, strain displacement relations, strain compatibility condition and stress compatibility conditions, Relations between Elastic Constants.

Unit-2

Unsymmetrical Bending

Stresses and deflections in beams subjected to unsymmetrical loading-Kern of section, Deflection of Beams, Shear Center.

Unit-3

Bending of Curved Beams

Bending Stresses and Deflections of Curved Beams.

Unit-4

Introduction to the Finite Element Method

Introduction, Node and Element Notations, The Truss Element, Beam and Frame Elements, Two Dimensional Elastic Elements, Higher Order and Three Dimensional Elastic Elements.

Unit-5

Finite Element Modeling Techniques

Planing and Creating the Finite Element Model (Preprocessing), Element Selection and Mesh Strategy, Load Application, Constraints, Preprocessing Checks, Processing the Model and Postprocessing.

Text Books

[1] Richard G. Budynas, Advanced Strength and Applied Stress Analysis, Mc Graw Hill Education (India), Second Edition, 2014

[2] L. S. Shreenath, Advanced Mechanics of Solids, Tata McGraw Hill Publication, 2014

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO

- Develop the analytical methods for solving problems in mechanics of solid those are generally considered beyond the scope of basic course in the discipline. As such, the developments tend to evolve from fundamentals principles such as equilibrium and conservation of energy.
- Understand fundamentals of linear elasticity and energy methods for solving torsion, bending problems.
- Gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures using Finite Element Analysis
- Prerequisites: Mechanics of Solids

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E. (Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1E2	L	T	P	L	T	P	Total
Fatigue Creep and Fracture	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject

The objectives of this course will be achieved by learning the phenomenon of fatigue creep & fracture Mechanism inside the metallic bodies also the behavior of the material can be understand under these states.

Prerequisites

Strength of Material, Machine Design & Material Science.

COURSE CONTENTS

UNIT-1

Introduction

Introduction & types of fatigue creep & Fracture phenomenon. Stress Analysis under fatigue, creep & Fracture. Material selection under the given conditions

UNIT -2

Fatigue

Types of fatigue leading and failure, Fatigue test, endurance limit, S-N diagram; Various failure relations, Viz., Soderberg, Modified Goodman-, Gerber parabolic-, Elliptical-relations; Factors influencing fatigue strength; Influence of stress concentration on fatigue test; Fretting corrosion; Effect of environment-corrosion fatigue; Increased fatigue life due to surface protection.

UNIT -3

Creep

Mechanics of creep, inter-granular, trans-granular creep, Creep test, Creep strain rate-time curves, Deformation mechanism map; High temperature properties of materials; Long time creep-stress-time relations; Creep contribution to the fracture mechanism; Creep contribution to the fracture mechanism; DVM, DVL German-standard, Hatfield time yield test.

UNIT -4

Fracture

Damage tolerance analysis, residual strength in presence of cracks; Mechanisms of crack growth and fracture; Basic modes of fracture; Stress Concentration factor, state of stress at a stress concentration, load-flow-times; Measurement of Collapse strength; Griffith's theory of brittle fracture; Irwin's theory of fracture in elastic-plastic materials; Theories of linear elastic plastic fracture mechanics (LEFM); Stress intensity fracture, toughness, stress distribution at crack tip: plane stress, plane strain cases; Theories of elastic plastic fracture mechanics (EPFM); Crack opening displacement (COD) Criterion, COD tests, crack tip opening displacement (CTOD) measurement; Crack arresters; Implementation of fracture control.

UNIT -5

Design against Creep

Types of creep, Introduction to Design against creep. Combined creep and fatigue failure prevention. Shearby Dorn Parameter, Larson Miller Parameter, Manson- Haferd Parameter.

BOOKS RECOMMENDED:

- [1] Norman E. Dowling, "*Mechanical Behavior of Materials: Engineering Methods for Deformation, Fracture, and Fatigue,*" 3rd edition, *Pearson Prentice Hall*, 2007.
- [2] Shigley J.E. , "*Mechanical Engineering Design*"McGraw Hill 2003.
- [3] Mubeen A. , "*Machine Design* "Khanna Publications (P) Ltd

COURSE OUTCOMES:**AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO**

Have the phenomenon of fatigue creep & fracture Mechanism inside the metallic bodies also the behavior of the material can be understand under these states.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1E3	L	T	P	L	T	P	Total
Mechanism and Robot Kinematics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: The objective of the subject is to introduce the students about the basic analytical techniques and fundamental principles of Robot Kinematics. The Pre requisites are knowledge of the basic course in theory of machines, matrix theory, probability, computer programming and mathematical analysis.

COURSE CONTENT

UNIT-1

Introduction to Robotics & Mechanisms

Introduction, Automation and Robotics, Robot anatomy and Robot configurations, Links and joints notations, End effectors, Work volume and Obstacles, Overview of Robot drive systems and Control systems, Robot sensing, Dynamic performance and Precision of movement, Applications in Robotics.

UNIT-2

Robot Arm Kinematics

Introduction, Forward or direct Kinematics Problem, Matrix Representations, Robot arm coordinates and Transformation matrix, Composite homogeneous transformation matrix, Denavit-Hartenberg representation, Kinematic equations, Location of end effector, Inverse kinematic problem, Geometric approach for solution of inverse kinematic problem.

UNIT-3

Trajectory Planning

Introduction, Constraints and Path specifications, Basic algorithm for generation of joint trajectory, joint interpolated trajectories, Cartesian path trajectory planning.

UNIT-4

Robot Arm Control.

Fundamentals of control system theory, Joint motion controls: Servo mechanism, Computed torque technique, Minimum time control, Variable structure control. Adaptive control modes.

UNIT-5

Robot Programming and Task Planning

Introduction, Characteristics of robotic programming languages, position and motion specification, development and debugging facilities, task-level programming and robot program synthesis, Robot intelligence and task planning.

BOOKS RECOMMENDED:

[1] Mikell P. Groover, *Industrial Robotics*, McGraw Hill Pvt. Ltd., New Delhi.

[2] K. S. Fu, R. C. Gonzalez, C. S.G. Lee, *Robotics: Control, Sensing, Vision and Intelligence*, McGraw Hill Book Company, Singapore, International Edition 1987.

[3] Robert J. Schilling, *Fundamentals of Robotics: Analysis & Control*, Prentice-Hall of India Private Limited, New Delhi, 5th Reprint, 2003

COURSE OUTCOMES:**AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO HAVE:**

- Techniques and fundamental principles of Robot Kinematics
- Robot anatomy and Robot configurations, Links and joints notations, End effectors, Work volume and Obstacles
- Constraints and Path specifications, Basic algorithm for generation of joint trajectory

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTR1E4	3	1	2	3	1	1	5
Thermal Systems : Simulation and Design							
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective of the Subject:

The basic objective of the subject is to have goal of achieving a workable system and of designing an optimum system. The possibility of optimization represents one of the few facets of this subject.

Pre requisites: Thermodynamics, Heat & Mass Transfer.

UNIT- 1

Designing a Workable System and its Economics:

Steps in Arriving at a Workable System, Creativity in Concept Selection, Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.

UNIT- 2

Dynamic Behaviour of Thermal Systems:

Dynamic Analysis, One Dynamic Element in a Steady State Simulation, Laplace Transformers, Inversion of Laplace Transforms, Feedback Control Loops, Time Constants Blocks, Cascaded Time Constant Blocks, Stability Analysis..

UNIT- 3

Modelling Thermal Equipment:

Using Physical Insight, Selecting vs Simulating a Heat Exchanger, Evaporators and Condensers, Condensation of a Binary Mixture, Overview of Search Methods, Assessment of Single Variable Searches.

UNIT-4

System Simulation:

Description of System Simulation, Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion, Newton Raphson Method with Multiple Equations .

UNIT- 5

Optimization:

Levels of Optimization, Mathematical Representation of Optimization Problems, Linear Programming, Setting up the Mathematical Statement, Calculus Methods of Optimization, Expansion of Lagrange Multiplier Equations, Unconstrained Optimization.

BOOKS RECOMMENDED

- [1] Cengel YA., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e, 2002.
- [2] Stoecker, WF. *Design of Thermal Systems*, McGraw Hill International Editions, New Delhi, 2007
- [3] Woodson, TT. *Introduction to Engineering Design*, McGraw Hill, New York, 1996.
- [4] Rudd, DF. *Strategy of Process Design*, McGraw Hill, New York, 1996

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

- Understand concept of Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.
- Can Selecting vs Simulating a Heat Exchanger, Evaporators and Condensers, Condensation of a Binary Mixture, Overview of Search Methods
- Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1G1	L	T	P	L	T	P	Total
Advanced Thermodynamics	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objective: The basic objective of the subject is to deal fundamentals of Thermodynamics, Compressible Fluid Flow properties, Thermodynamics relations & Exergy.

Prerequisite: Basic Engineering Thermodynamics.

COURSE CONTENT

UNIT 1

Mass And Energy Analysis Of Control Volume

Control Volume, Steady Flow Process, Mass Balance and Energy Balance in a Simple Steady Flow Processes, Variable Flow Processes, Comparison of SFEE with Euler and Bernoulli Equations, Examples of a Variable Flow Problems. Illustrative Problems.

UNIT 2

Thermodynamic Property Relations

Mathematic Theorems, Maxwell's Relations, Tds Equations, Heat Capacities, Joule Kelvin Effects, Clausius Clapeyron Equation, Gibb's Phase Rule, General Thermodynamic considerations on an Equation of State. Illustrative Problems

UNIT 3

Exergy

Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency, Exergy Change of System, Exergy of a Closed System, Exergy of a Steady Flow System, Maximum Work Obtainable Conditions, Illustrative Problems

UNIT 4

Vapour Power Cycles

General Aspects, Simple Steam Power Cycle, Rankine Cycle, Reheat Cycle, Ideal Regenerative Cycle, Feedwater Heaters, Exergy Analysis of Vapour Power Cycles, Illustrative Problems

UNIT 5

Finite Time Thermodynamics

General Aspects, Application of principles on Reversible and Irreversible Cycles, Maximum Power Output conditions, Effect of Cycle Irreversibility Parameter on the performance of the Cycles, Performance of Engines working under Maximum Power and Maximum Power Density conditions, Entropy Generation Minimization, Concepts of Virtual Entropy, Illustrative Problems.

Books Recommended:

[1.] Y.A Cengel, *Thermodynamics-An Engineering Approach* , McGraw Hill Companies,2006.

[2.] P.K Nag, *Engineering Thermodynamics* , The McGraw Hill Companies, Third Edition

COURSE OUTCOMES:**AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :**

- Perform Comparison of SFEE with Euler and Bernoulli Equations,
- Mathematic Theorems, Maxwell,s Relations, TdS Equations, Heat Capacities
- Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency
- General Aspects, Application of principles on Reversible and Irreversible Cycles

Devi Ahilya University, Indore, India Institute of Engineering & Technology			1 Year M.E.(Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1G2	L	T	P	L	T	P	Total
Non Conventional Energy Systems	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective: The objective of the subject to acquaint the students the renewable energy technological systems, its principle ,working, system design and analysis of present systems, to analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.

Pre requisites: Thermal Engineering, Heat and Mass transfer, fluid mechanics, steam engineering, combustion technology.

COURSE CONTENT

UNIT-1

Solar Energy

Solar radiation its measurements and prediction - solar thermal flat plate collectors concentrating collectors – applications - heating, cooling, desalination, power generation, drying, cooking etc - principle of photovoltaic conversion of solar energy, types of solar cells and fabrication. Photovoltaic applications: battery charger, domestic lighting, street lighting, and water pumping, power generation schemes. Design and Thermal analysis.

UNIT-2

Wind Energy

Atmospheric circulations – classification - factors influencing wind - wind shear – turbulence - wind speed monitoring - Betz limit - Aerodynamics of wind turbine rotor- site selection - wind resource assessment - wind energy conversion devices - classification, characteristics, and applications. Hybrid systems - safety and environmental aspects.

UNIT-3

Bio-Energy

Biomass resources and their classification - chemical constituents and physicochemical characteristics of biomass - Biomass conversion processes - Thermo chemical conversion: direct combustion, gasification, pyrolysis and liquefaction - biochemical conversion: anaerobic digestion, alcohol production from biomass - chemical conversion process: hydrolysis and hydrogenation. Biogas - generation - types of biogas Plants- applications Design of bio gas digesters, landfill gas systems and gasifiers.

UNIT-4

Hydrogen and Fuel Cells

Thermodynamics and electrochemical principles - basic design, types, and applications - production methods - Bio photolysis: Hydrogen generation from algae biological pathways - Storage gaseous, cryogenic and metal hydride and transportation. Fuel cell – performance characteristics ,principle of working- various types - construction and applications.

UNIT-5

Other Types of Energy

Ocean energy resources - principles of ocean thermal energy conversion systems - ocean thermal power plants - principles of ocean wave energy conversion and tidal energy conversion – hydropower – site selection, construction, environmental issues - geothermal energy - types of geothermal energy sites, site selection, and geothermal power plants, MHD, Thermal analysis

Note: HMT Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Sukhatme, S.P., Solar Energy, Tata McGraw Hill, 1984.
- [2] Twidell, J.W. and Weir, A., Renewable Energy Sources, EFN Spon Ltd., 1986.
- [3] Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw-Hill, 1978.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

- Perform Comparison of SFEE with Euler and Bernoulli Equations,
- Mathematic Theorems, Maxwell,s Relations, TdS Equations, Heat Capacities
- Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency
- General Aspects, Application of principles on Reversible and Irreversible Cycles

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR1G3	L	T	P		L	T	P	Total
Management Information System	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of Management Information System. The subject is useful in understanding the various information sources and database structures.

COURSE OF CONTENTS

Unit-1

Introduction to Management Information Systems

An Overview of Management Information Systems, Structure of a Management information System.

Survey of Information Systems Technology

Hardware, Software, and Communication technology for Information Systems, Storage and Retrieval of Data, Transaction Processing, Office Automation and Information processing Control Functions.

Unit-2

Conceptual Foundations

The Decision Making Process, Concepts of Information, Humans as information Processors, System Concepts, Concepts of Planing and Control, Organizational Structures and Management Concepts.

Unit-3

Information Based Support System

Support Systems for Planing, Control and Decision Making, Support Systems for Management of Knowledge Work.

Unit-4

Information System Requirements

Developing a Long Range Information System Plan, Strategies for the Determination of Information Requirements, Database Requirements, User Interface Requirements.

Unit-5

Development, Implementation and Management of Information System Resources

Developing and Implementing Application Systems, Quality Assurance and Evaluation of Information Systems, Organizational and Management of the Information Resources Functions, Future Development and Their Organizational and Social Implications.

Text Books

- [1] Gordon B. Davis and Margrethe H. Olson, "Management Information Systems - Conceptual Foundations, Structures and Development, Mcgeaw Hills International Editions.

COURSE OUTCOMES:

- Structure of a Management information System.
- , Transaction Processing, Office Automation and Information processing Control Functions.
- Organizational Structures and Management Concepts.
- Developing a Long Range Information System Plan

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR1G4 Finite Element Analysis	L	T	P		L	T	P	Total
	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites:

The basic objective of the subject is to deal with the fundamentals of Finite Element Methods. The subject is useful in understanding the concept of Solving problems using finite element approach.

COURSE OF CONTENTS

Unit-1

Introduction

Introduction, Approximate Methods of Analysis, Finite Element Method-An Introduction, Different Approaches in FEM.

Unit-2

Finite Elements and Interpolation Functions

Interpolation Functions, One Dimensional Elements, Two Dimensional Elements, Three Dimensional Elements.

Unit-3

One Dimensional Finite Element Analysis

Linear Spring, Truss Element, 1D Torsion of a Circular Shaft, 1D Steady State Heat Conduction, 1D Flow Through Porous Media, 1D Ideal Fluid Flow Through Pipes, Beam Element, Analysis of Plane Frames and Grids.

Unit-4

Two Dimensional Finite Element Analysis

2D Flow through Porous Media, 2D Stress Analysis, Iso-Parametric Formulation, Finite Element Solution of Partial Differential Equations by Method of Weighted Residual, FEM Formulation Based on Variational Principle, Finite Element Solution of Stokes Flow Equations.

Unit-5

Three Dimensional Finite Element Analysis

Axi-Symmetric Solids, 8 Node Isoparametric Element for 3D Stress Analysis, Computer Implementation of FEM, Applications of Finite Element Method.

Text Books

- [1] Y. M. Desai, T. L. Eldho, A. H. Shah, “Finite Element Method with Applications in Engineering”,
- [2] Pearson Publication.
- [3] Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, “Concepts and Applications of Finite Element Analysis”, Wiley India (P) Ltd.
- [4] Chennakesava R. Alavala, “Finite Element Methods Basic Concepts and Applications”, PHI
- [5] Learning Private Limited.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week						
DTR2C1	L	T	P	L	T	P	Total
MACHINERY FAULT DIAGNOSIS & SIGNAL PROCESSING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective & Pre requisites:

The basic objective of the subject is to deal with the analysis of faults generated inside the machine during the operations. The subject provides the basic knowledge of the methods used for the prevention of the faults and also the approach for analyzing the signals generated during the faulty condition of the machine. The Pre requisites are Tribology and Vibration.

UNIT- 1

Introduction to Diagnostic Maintenance and Condition Monitoring:

Introduction to condition based maintenance, applications and economic benefits, signature analysis-online & offline technique, various condition monitoring techniques, levels condition monitoring, fault detection and diagnosis.

UNIT- 2

Fault Diagnosis using Vibration Monitoring:

Vibration monitoring and analysis, shock pulse methods, noise monitoring, envelope detection technique, types of vibration test, field balancing, case studies on vibration based condition monitoring.

UNIT- 3

Noise Monitoring & Control:

Introduction to noise, properties of noise, loudness and weighting networks, octave and FFT analysis, impulsive noise, instrumentation for noise measurement and analysis, sound power, sound intensity, noise source location, noise diagnostics, noise monitoring of machines with example, cepstrum analysis, noise control methods, maintenance and noise reduction, vehicle and machinery noise, noise standards, case studies.

UNIT-4

Advanced Methods of Condition Monitoring:

Oil analysis including wear debris and contaminant monitoring, performance monitoring, non-destructive techniques, IR-Thermography, ultrasonic monitoring, reliability centred maintenance, higher order spectrum/advanced signal processing.

UNIT- 5

Computer Aided Monitoring:

Application and choice of the methods, computer aided monitoring including experts system like artificial neural network, fuzzy logic and other optimizing techniques, practical applications and case studies on computer based condition monitoring.

BOOKS RECOMMENDED

- [1] Ramamurthy V., *Mechanical Vibration Practice with Basic Theory*, Narosa Publication House, New Delhi 1e, 2002.
- [2] Rao J S & Gupta K. *Introductory Course on Theory and Practice of Mechanical Vibration*, New
- [3] Age Publisher, New Delhi, 2e, 2002
- [4] Rao J S, *Vibratory Condition Monitoring of Machine*, Narosa Publishing House, New Delhi, 1e, 2002.
- [5] Mishra R C & Pathak K., *Maintenance Engineering & Management*, Printice Hall of India, New Delhi, 1e, 2002.
- [6] Gopalkrishnan P. & Banerji AB, *Maintenance & Spare Part Management*, Printice Hall of India, New Delhi, 3e, 2002.
- [7] Hand Book of Condition Monitoring by BKN Rao, UK.

LABORATORY EXPERIMENTS:

- Case studies based on vibration based condition monitoring.
- Experimental analysis of Noise based condition monitoring.
- Experimental analysis of faults using IR-Thermography .
- Experimental analysis of faults using Non- Destructive methods.
- Case studies on computer aided fault diagnosis.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

- Approximate Methods of Analysis,
- Fluid Flow Through Pipes, Beam Element, Analysis of Plane Frames and Grids.
- 2D Flow through Porous Media, 2D Stress Analysis
- Axi-Symmetric Solids, 8 Node Isoparametric Element for 3D Stress Analysis
- One Dimensional Elements, Two Dimensional Elements

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Design & Thermal Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR2C2	L	T	P	L	T	P	Total
Advanced Refrigeration and Air Conditioning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives & Prerequisites: Advancements in Refrigeration and Air Conditioning Technologies. Fundamentals of Thermodynamics, Heat transfer, Refrigeration cycles, Psychrometry

COURSE CONTENT

UNIT-1

Advanced Vapour Compression Technologies:

Single Stage System; Multistage Refrigeration: Two-stage with given Intermediate Pressure, Optimum Interstage Pressure, Cascade Refrigeration System; Liquefaction of Gases: Linde–Hampson Cycle: Precooled Linde–Hampson Cycle; Claude’s Cycle; Energy and Exergy analyses.

UNIT-2

Advanced Vapour Absorption and other Technologies

Vapor Absorption Systems: Ammonia-Water, Three fluid, Water-Lithium bromide; Solar-Powered Absorption Refrigeration System, Multi Stage Absorption Systems, Energy and Exergy analyses of Vapour Absorption Systems.

UNIT-3

Load Estimation and Air Conditioning Systems

Psychrometry, Psychrometric Processes, Load Estimation, Air-conditioning Systems: Classification- All Air, Air and water, All water Systems; Decentralized Cooling and Heating; Individual systems; Evaporative; Dessicant; Thermal storage; Clean room; Space systems; Packaged; Central systems

UNIT-4

Fans and Duct Design

Fans: Classification, Performance Characteristics and selection; Flow basics: Continuity Equation,

Bernoulli’s Equation, Flow head loss; Ducts: Types, pressure characteristics, system pressure loss; Duct

design: Equal-friction, Constant-velocity method, Static regain method

UNIT-5

Controls

Control Loop and Control Methods; Control Modes: Two-position, Step and Modulating, Floating, Proportional; Proportional plus Integral (PI), Proportional-Integral-Derivative (PID); Controllers: Direct / Reverse acting, Pneumatic, electric, digital; Valves and actuator; Dampers

BOOKS RECOMMENDED:

- [1] W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 4e, 1985
- [2] Prasad M, *Refrigeration and Air conditioning*, New Age International, 2e, 2011
- [3] Arora C P *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
- [4] W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
- [5] Shan Wang, *Handbook of Air-Conditioning and Refrigeration*, McGraw-Hill Book Company, 2e, 2000
- [6] McQuiston F C., Parker J.D. and Spitler J. D., *Heating, Ventilating, and Air-Conditioning Analysis and Design*, John Wiley & Sons, 6e, 200
- [7] 7.

LABORATORY EXPERIMENTS:

- To calculate actual and ideal Coefficient of Performance of vapour compression trainer.
- To calculate actual and ideal Coefficient of Performance of vapour Absorption System
- To carry out various psychrometric process in Air-conditioning trainer.
- To estimate the Heating and cooling load of an enclosure
- To design a duct network for a given plan

COURSE OUTCOMES:

- Student will be able to deal with the analysis of faults generated inside the machine during the operations. And will have knowledge of the methods used for the prevention of the faults and also the approach for

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E. (Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR2C3	L	T	P	L	T	P	Total
Computer Aided Modeling and Simulation	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives:

- To understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- To model complex shapes including freeform curves and surfaces.
- To understand various graphics standard for CAD data exchange (such as IGES, PARA etc).
- To understand the application of Computers in Analysis and Design of Machine Elements.

COURSE CONTENT

UNIT - 1

INTRODUCTION

Fundamentals of CAD: Introduction: Design Process: Application of computers in design: Benefits of CAD. Computer Hardware: Graphic input devices; display devices; Graphic output devices; Central processing unit (CPU), Workstations.

UNIT- 2

COMPUTER GRAPHICS

CAD software and Database: Software configuration of a graphics system, Output primitives frame buffer – Bresenham’s Algorithm – Line – Circle – function of graphics software - 2D & 3D transformation – Translation – scaling – Rotation – Homogeneous coordinate – Concatenation, clipping algorithm.

UNIT - 3

TECHNIQUES FOR GEOMETRIC MODELING

Geometric Modelling: Curves And Surfaces- Representation, Wire Frame models, Intrinsic and parametric representations, analytic and parametric curves and surfaces, Manipulations of curves and surfaces.

UNIT- 4

TECHNIQUES FOR GEOMETRIC MODELING AND DATA EXCHANGE STANDARDS

Geometric Modeling: Solids- Solid models, Fundamentals of Solid Modeling, Half -spaces, Boundary Representation (B-rep), Constructive Solid Geometry (CSG), Sweep Representation, Analytic Solid Modeling, Solid Manipulations.

Graphics standards – GKS, Data exchanger standards – IGES – STEP - DXF – Concept of data storage for solid models.

UNIT - 5

VISUAL REALISM

Introduction, Model Clean-up, Hidden Line Removal, Hidden Surface Removal, Hidden Solid Removal, Shading, Coloring and User Interface for Shading and Coloring, Introduction to CAD Modeling Systems. Tolerance and Interference Analysis

Text Book:

- [1.] Zeid Ibrahim and R Sivasubramanian, *CAD / CAM Theory and Practice*, 2nd Edition, 3rd Reprint, 2010, Tata McGraw Hill Education Private Limited, New Delhi.
- [2.] P N Rao, *CAD/CAM Principles and Applications*, 3rd Edition, 4th Reprint, 2011, Tata McGraw Hill Education Private Limited, New Delhi.
- [3.] M Groover and E Zimmers, *CAD/CAM Computer Aided Design and Manufacturing*, 10th Impression, Pearson Education.
- [4.] Krishnamoorathy C.S. and J.S. Rajeev, *Computer Aided Design (Software and Analysis Tools)*, Narosa Pub House, New Delhi

List of Practicals:

1. To draw the basic geometrical shapes such as line, triangle, rectangle etc using programming language Autolisp/C++/etc.
2. To perform the various geometrical transformations on the geometrical shapes drawn in practical 1 using programming language Autolisp/C++/etc.
3. To model the simple machine elements like gear, shaft, pulleys, cams etc parametrically using CAD/CAM software.
4. To obtain the 2d drawings from the 3d object created in practical 3.
5. To create the assembly of machine elements using CAD/CAM software.
6. To perform the finite element analysis of machine elements using CAD/CAM Software.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- Can model complex shapes including freeform curves and surfaces.
- Understand various graphics standard for CAD data exchange (such as IGES, PARA etc).
- Understand the application of Computers in Analysis and Design of Machine Elements.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week						
DTR2E1	L	T	P	L	T	P	Total
MACHINE VIBRATIONS ANALYSIS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective of the subject: The objective of the subject is to deal with machine vibration analysis techniques and advanced areas of vibrations of machine elements based on Undamped and Damped Free Vibrations for single degree of freedom systems, Multi-degree of Freedom and Continuous Systems . Pre requisites are Theory of vibrations , Machine Design I and Machine Design II.

UNIT-1

Review: Fundamentals of Vibration

Main causes, Advantages and Disadvantages. Vector method of representing Harmonic motion. Characteristics of vibration. Harmonic analysis. Beats Phenomenon. Work done by harmonic forces on harmonic motion. Periodic, non-harmonic functions: Fourier Series analysis, Evaluation of coefficients of Fourier series. Elements of vibratory system. Lumped and distributed parameter systems.

UNIT -2

Systems with single and two Degrees of Freedom

Forced harmonic vibration: vector representation of forces. Excitation due to Rotating and Reciprocating unbalance. Vibration isolation, Force transmissibility. Motion transmissibility: absolute motion of mass and relative motion of mass.

Undamped free vibrations and Principal Modes of vibration. Torsional vibrations. Forced Undamped vibrations with harmonic excitation.

UNIT -3

Systems with Multi-degree of Freedom and Continuous Systems.

Equations of motion. The Matrix method : Eigen values and eigen vectors. Vibration of Strings. Longitudinal vibrations of bars. Torsional vibrations of Circular Members. Transverse Vibrations of Beams.

UNIT -4

Determination of Natural Frequencies

Approximate methods of determining fundamental frequencies: Dunkerleys lower bound approximation and Rayleighs Method. Stodolas Method. The Holzers Method. The Method of Matrix Iteration, Envelop Analysis.

UNIT -5

Numerical Integration methods in Vibration Analysis

Introduction, Finite Difference Method, Runge-Kutta Method for single degrees of freedom systems, Houbolt method ,Finite Difference method for continuous systems.

BOOKS RECOMMENDED: Reference books:

- [1] Thomson W.T., *Theory of Vibration with Applications*, CBS Pub. And Distributors.
- [2] Morse T., and Hinkle, *Mechanical Vibration*, Prentice Hall of India Pvt. Ltd.
- [3] Singiresu S. Rao, *Mechanical Vibrations*, Pearson Education.,2005
- [4] Ambekar A. G., *Mechanical Vibrations and Noise Engineering* , Prentice Hall of India Pvt. Ltd.,2006
- [5] G. K. Grover, *Mechanical Vibrations*, Nem Chand and Bros., Roorkee.

LABORATORY EXPERIMENTS:

- Performance Analysis of single degree of systems.
- Performance Analysis of two degree of systems.
- Performance Analysis of multi degree of systems.
- Study of vibration signature analysis methods
- Study of vibration measuring instruments

COURSE OUTCOMES:**AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:**

- Learn various Fourier Series analysis, Evaluation of coefficients of Fourier series. Elements of vibratory system. Lumped and distributed parameter systems.
- Understand the concept of Undamped free vibrations and Principal Modes of vibration. Torsional vibrations
- Learn Finite Difference method for continuous systems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			M.E.(Design & Thermal) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
DTR2E2	L	T	P	L	T	P	Total
EXPERIMENTAL STRESS ANALYSIS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective & Pre requisites:

The basic objective of the subject is to deal fundamentals of stress analysis techniques. The subject is useful in understanding the behavior of material under the load and distribution of stress inside the material. The Pre requisites are material science, machine design and measurement and control.

UNIT- 1

Introduction:

Introduction to theory of elasticity. General principles governing the approach to experimental stress analysis technique. Principal of measurements. Accuracy, Sensitivity and range of measurement.

UNIT- 2

Polariscope & Extensometer:

Plain polariscope, circular polariscope, white light illumination, analysis of photoelastic data, Moira Method, Mechanism of formation of Moira fringe-geometrical approach to Moire fringe analysis-displacement field approach to Moire fringe analysis., Mechanical , Optical , Acoustical and Electrical extensometer and their uses, advantages and disadvantages.

UNIT- 3

Electrical Resistance Strain Gauge:

Principal of operation and requirement, types and their uses, Material of strain gauge, Calibration and temperature compensation, cross sensitivity, Rosette analysis, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators, strain gauge adhesive and mounting methods.

UNIT-4

Photoelasticity:

Two dimensional photoelasticity. Concepts of light-photo-elastic effects, stress optic law, Interpretation of fringe pattern, compensation and separation technique, photoelastic material, Introduction to three dimensional photoelasticity, digital photoelasticity, Effects of stressed model in a plane polariscope.

UNIT- 5

Non Destructive Testing:

Fundamentals of NDT, Radiography, Ultrasonic, Magnetic particle inspection, Fluorescent penetrate technique, Eddy current testing, Acoustic Emission Technique, Fundamentals of brittle coating methods, Holography, Ultrasonic, C-Scan, Thermography, Fibre optic Sensors.

BOOKS RECOMMENDED

- [1] Dally J.W. and Riley, W.F. “*Experimental Stress Analysis*” Mc Graw Hill Inc., New York, 1978
- [2] Hetenyi M “*Hand Book of Experimental Stress Analysis*” John Wiley and Sons Inc. New York,
[3] 1972.
- [4] Srinath L.S., Raghava M.R., Lingaiah, K.Gargesha G, Pant B, Ramchendra K., “*Experimental Stress Analysis*” Tata Mc Graw Hill, New Delhi., 1984
- [5] Singh S. “*Experimental Stress Analysis*” Khanna Publication, 2001.
- [6] Mubeen., *Machine Design*, , Khanna Publications(P) Ltd.,2004.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Learn the concept of Principal of measurements. Accuracy, Sensitivity and range of measurement.
- Learn the concept of temperature compensation, cross sensitivity, Rosette analysis
- Apply Material of strain gauge, Calibration and temperature compensation, cross sensitivity concept
- Learn the concept of three dimensional photo elasticity, digital photo elasticity, Effects of stressed model in a plane polariscope.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTR2E3 APPLIED ELASTICITY AND PLASTICITY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject:

With this subject, the students get knowledge of the various Mechanical engineering materials property as well as behavior of material under Elastic & Plastic zone with different plane of surface.

Prerequisite(s): Strength of Material, Material Science.

COURSE CONTENTS

UNIT - 1

Elasticity

Analysis of stress and strain relationship – Generalized Hook's law, Plane stress and plane strain problems, The state of strain at a point, Basic equations of elasticity, Methods of solution of elasticity problems.

UNIT- 2

Two-Dimensional Problems in Cartesian Co-Ordinates

Two dimensional problems in Cartesian and polar co-ordinates for simple problems, Airy's stress function, Bi harmonic equation, Saint Venant's Principle, Thick cylinder, Bending of curve bars , Simply supported rectangular beam under a triangular load, Fourier series, Complex potentials, Cauchy integral method , Fourier Transform Method, Real potential methods.

UNIT-3

Torsion of Non Circular Section

Methods of analysis, Membrane analogy, Torsion of thin rectangular section and hollow thin walled section, St. Venant's theory, Torsion of hollow cross-sections, Torsion of thin – walled tubes, Torsion of hollow bars, Analogous methods, Torsion of bars of variable diameter.

UNIT-4

Numerical and Energy Methods

Principle of Virtual Work-Energy theorem, Rayleigh Ritz method, Deflection of beams problems, Finite difference method, Rayleigh's method, Finite element method.

UNIT-5

Plasticity

Physical assumption , Mechanical models, Kelvin and Maxwell model, Viscous elasticity, Friction and Coulomb models, Parallel and Hybrid models, Applications, Criterion of Yielding, Yield surface, Flow rule, Elastic – Plastic problem in bending, Torsion and Thick cylinders, Introduction to Fracture mechanics, Wave propagation in plastic materials. Theory and application of slip line field, Bound theorem, Plastic anisotropic large deformation.

BOOKS RECOMMENDED:

- [1] Timoshenko S., *Theory of Elasticity*, Mc Graw Hill Book Co., Newyork1988.
- [2] Singh S, *Theory of Elasticity*, Khanna Publishers, New Delhi.1988.
- [3] Singh S., *Theory of Plasticity*, Khanna Publishers, New Delhi.1988.
- [4] Chakrabarty J., "*Applied Plasticity*", Springer New Yark, 1st ed. 2000.
- [5] Hoffman, "*Theory of Plasticity*", Mc Graw Hill, 2nd ed. 1985.
- [6] Johnson, "*Engineering plasticity*", Van Nostrand, 1st ed. 1983.

COURSE OUTCOMES:

- Perform Analysis of stress and strain relationship
- Saint Venant's Principle, Thick cylinder, Bending of curve bars , Simply supported rectangular beam under a triangular load, Fourier series, Complex potentials,
- Apply Torsion of thin – walled tubes, Torsion of hollow bars, Analogous methods, Torsion of bars of variable diameter.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2E4	L	T	P	L	T	P	Total
AUTOMOTIVE SYSTEM ANALYSIS & DESIGN	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: The objective is to understand the principles and working of different systems of Automobiles & design principal & its applications.

Pre requisites: Machine Design and Strength of Material.

COURSE CONTENT

UNIT-1

Design for Tool Drive

Design of machine tools, machine tools motions, transmission-rotation in to rotation, rotation in to translation, kinematic-structures of machine tools: elementary, complex and compound structure elementary, complex and compound structure, kinematic-features of gear shapers and gear hobbing machine.

UNIT-2

Transmission System

Requirements Clutches, Toque converters, Over Drive and free wheel, Universal joint. Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle. Castor Angle, wheel camber, Steering geometry, Ackerman mechanism.

UNIT-3

Electrical and Control Systems

Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Electric fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Battery operated vehicles. Microprocessor based control system for automobiles, Car air conditioning systems and components, Indian standards for automotive vehicles exhaust emission Bharat and Euro norms, Indian Motor vehicle act- preliminary information.

UNIT-4

Chassis and Body Engineering

Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Location of engine, Front wheel and rear wheel drive, Performance of Vehicle.

UNIT-5

Suspension System

Vehicle Dynamics and requirement of suspension , Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, ABS, Performance- Braking efforts, Efficiency, Stopping Distance & time, tendency of over turning.

BOOKS RECOMMENDED:

- [1] Singh Kirpal, Automobile Engineering, Vol.1, Standard Pub, 9e.
- [2] Giri N.K., Automotive Technology, Khanna Pub, 4e 2009.
- [3] Newton & Steeds, Automobile Engineering, Butterworth Int.
- [4] Heitner Joseph, Automotive Mechanics, Principles and Practices, East-West Pub.
- [5] Crouse W.H., Automotive series Part-I to VI, Tata McGrawhill, 9e.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Can apply kinematic-structures of machine tools: elementary, complex and compound structure elementary,
- Learn the concept of Gear Mechanism of Rear Axle. Automatic transmission
- Learn the concept of Signaling devices and circuit, Battery operated vehicles. Microprocessor based control system for automobiles.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Design& Thermal) (Full Time)			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2G1	L	T	P	L	T	P	Total
Advanced Heat Transfer	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites:

Advancements in the topics on Heat Transfer Engineering. Fundamentals of Thermodynamics, Heat transfer at Undergraduate level

COURSE CONTENT

UNIT-1

Steady State Unidirectional Heat Conduction with Heat Generation:

Heat flow through slab with heat generation, Heat flow through cylinder with heat generation, Dielectric heating, Heat conduction with heat generation when generation is a function of position, Heat conduction with heat generation when generation is a function of temperature, Steady state two dimensional heat conduction, Purpose of Insulation, Critical Radius of Insulation.

UNIT-2

Unsteady State Unidirectional Heat Conduction:

Unsteady state heating or cooling, Unsteady state heat conduction through finite slab with negligible thermal resistance, Unsteady state heat conduction through finite slab with thermal resistance, Heisler charts, Periodic heat flow.

UNIT-3

Thermodynamic Analysis of Heat Exchangers:

Introduction, Temperature distribution and heat flow, Overall heat transfer coefficient, Fouling of Heat Exchangers, Effectiveness method (NTU) to study the performance of Heat Exchangers, Second Law analyses of Counter and Parallel flow type Heat Exchangers (Exergy Analysis), Finite Time Thermodynamic (FTT) analyses of Heat Exchangers.

UNIT-4

Advanced Convection Principles

Conservation principles; Differential and Integral Equations of momentum and Energy for Laminar and Turbulent Boundary Layers; Heat Transfer in Laminar Internal and External Flows: Axial Variations of Surface temperature and Heat flux; Heat Transfer in Turbulent internal and External Flows.

UNIT-5

Advanced Radiation

Review of fundamentals; View factors: Definition and Evaluation, Area Integration, Contour Integration, View factor algebra, Inside sphere method, unit sphere method, Radiative Heat exchange between gray diffuse surfaces; solution methods for governing integral methods, Partially specular gray and nonideal surfaces.

BOOKS RECOMMENDED:

- [1] Bergman T.L., Lavine A. S., Incropera F. P. and Dewitt D. P. , *Fundamentals of Heat And Mass Transfer*, John Wiley & Sons, 7e, 2011
- [2] Kreith F., Manglik R. M., and Bohn M. S., *Principles of Heat Transfer*, Cengage Learning, 7e 2011
- [3] Kays W., Crawford M., Weigand B., *Convective Heat and Mass Transfer*, McGraw-Hill Book Company, 4e, 2005
- [4] Modest M. F., *Radiative Heat Transfer*, McGraw-Hill, Inc. 1993
- [5] Bejan A, *Convective Heat Transfer*, McGraw-Hill Book Company, 4e, 2005

COURSE OUTCOMES:

- Apply the concept of heat conduction with heat generation
- Basic understanding of Unsteady state heat conduction through finite slab with thermal resistance
- Learn the Effectiveness method (NTU) to study the performance of Heat Exchangers
- Learn Heat Transfer in Laminar Internal and External Flows

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year M.E.(Design& Thermal) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTP3G1							
Advanced Heat Transfer	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites:

Advancements in the topics on Heat Transfer Engineering. Fundamentals of Thermodynamics, Heat transfer at Undergraduate level

COURSE CONTENT

UNIT-1

Steady State Unidirectional Heat Conduction with Heat Generation:

Heat flow through slab with heat generation, Heat flow through cylinder with heat generation, Dielectric heating, Heat conduction with heat generation when generation is a function of position, Heat conduction with heat generation when generation is a function of temperature, Steady state two dimensional heat conduction, Purpose of Insulation, Critical Radius of Insulation.

UNIT-2

Unsteady State Unidirectional Heat Conduction:

Unsteady state heating or cooling, Unsteady state heat conduction through finite slab with negligible thermal resistance, Unsteady state heat conduction through finite slab with thermal resistance, Heisler charts, Periodic heat flow.

UNIT-3

Thermodynamic Analysis of Heat Exchangers:

Introduction, Temperature distribution and heat flow, Overall heat transfer coefficient, Fouling of Heat Exchangers, Effectiveness method (NTU) to study the performance of Heat Exchangers, Second Law analyses of Counter and Parallel flow type Heat Exchangers (Exergy Analysis), Finite Time Thermodynamic (FTT) analyses of Heat Exchangers.

UNIT-4

Advanced Convection Principles

Conservation principles; Differential and Integral Equations of momentum and Energy for Laminar and Turbulent Boundary Layers; Heat Transfer in Laminar Internal and External Flows: Axial Variations of Surface temperature and Heat flux; Heat Transfer in Turbulent internal and External Flows.

UNIT-5

Advanced Radiation

Review of fundamentals; View factors: Definition and Evaluation, Area Integration, Contour Integration, View factor algebra, Inside sphere method, unit sphere method, Radiative Heat exchange between gray diffuse surfaces; solution methods for governing integral methods, Partially specular gray and nonideal surfaces.

BOOKS RECOMMENDED:

- [1] Bergman T.L., Lavine A. S., Incropera F. P. and Dewitt D. P. , *Fundamentals of Heat And Mass Transfer*, John Wiley & Sons, 7e, 2011
- [2] Kreith F., Manglik R. M., and Bohn M. S., *Principles of Heat Transfer*, Cengage Learning, 7e 2011
- [3] Kays W., Crawford M., Weigand B., *Convective Heat and Mass Transfer*, McGraw-Hill Book Company, 4e, 2005
- [4] Modest M. F., *Radiative Heat Transfer*, McGraw-Hill, Inc. 1993
- [5] Bejan A, *Convective Heat Transfer*, McGraw-Hill Book Company, 4e, 2005

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR2G2	L	T	P		L	T	P	Total
RAPID PROTOTYPING	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objective: To understand the basics of non-conventional prototyping processes.

COURSE OF CONTENT

UNIT-1

Basic operation, Role of Rapid Prototyping and tooling in product development and simultaneous engineering, Applications. Rapid Prototyping Processes Principles of RP processes, Classification, Laminated object manufacturing, Fused deposition modeling, Sterolithography, Solid ground curing, Selective laser sintering - 3D printing.

UNIT-2

CAD Requirements in RP introduction, Data requirements, Solid modeling, Surface modeling, Geometric processing, Interface formats, Model preparation, Slicing, Support structures and machine instructions

UNIT-3

Materials for Rapid Prototyping Plastics, Resins, Metals, Ceramics, Selection of Materials for suitable processes, Advantages and limitations.

UNIT-4

Rapid Tooling Techniques Rapid tooling techniques such as Silicone rubber molding, Epoxy molding, Electroforming, Vacuum casting, Vacuum forming, Laminated metallic tooling, Direct metal laser sintering.

UNIT-5

Rapid Manufacture Introduction, Material and process controls for Rapid manufacture, Production economics, Implementation, Applications, automotive, aeronautical, space applications, additive manufacturing for construction industry, retail industry

Text Books

- [1.] Pham, D.T., Dimov, S.S. (2001) Rapid Manufacturing, Springer-Verlag London Limited.
- [2.] Neil Hopkinson, Richard Hague, Philip Dickens (Editors) Rapid Manufacturing: An Industrial Revolution for the Digital Age, Wiley Publication, 2005.
- [3.] Rafiq I. Noorani, Rapid Prototyping: Principles and Applications, Wiley Publication, 2005.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Learn Prototyping and tooling in product development and simultaneous engineering
- Learn modeling, Surface modeling, Geometric processing
- Learn Rapid tooling techniques such as Silicone rubber molding

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2G3 COGENERATION AND WASTE HEAT RECOVERY	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objective & Pre requisites:

The objective of the subject is to provide an understanding of energy conservation in various thermal engineering applications. The Pre requisites are Thermodynamics, Fluid Mechanics and Heat Transfer.

UNIT- 1

Energy Usage and Conservation

Energy: forms and Conversion; Patterns of energy use; potential for energy conservation; optimum use of energy resources; total energy approach.

UNIT- 2

Thermodynamic Cycles and Cogeneration

Review of Various Thermodynamic cycles; Coupled cycles; Systems approach to a thermal engineering application based plants; combined plants and cogeneration systems.

UNIT- 3

Energy Storage

Energy Storage Systems: thermal electrical, magnetic and chemical energy storage systems, Need for energy storage; Utilization of industrial waste heat: gas-to-gas, gas-to-liquid and liquid-to-liquid heat recovery systems.

UNIT-4

Waste Heat Recovery

Heat Recovery systems; Recuperators and regenerators; heat pipes; waste heat boilers; fluidized bed heat recovery; shell and tube heat exchangers

UNIT- 5

Heat Recovery Sources

Sources of heat recovery; Prime mover exhausts; incineration plants; heat pump systems; thermoelectric devices. Utilization of low grade rejected heat from power plants.

BOOKS RECOMMENDED

[1] Reay, D. A., *Heat Recovery Systems*, London, 1979.

[2] Boyce, M, P.,. *Handbook for Cogeneration and Combined Cycle Power Plants*, ASME 2002

[3] Fin David, *Cogeneration: A Users Guide*, IET

[4] Daiment, *Energy Systems*, Longman, UK

COURSE OUTCOMES:

- Potential for energy conservation; optimum use of energy resources;
- Coupled cycles; Systems approach to a thermal engineering application based plants
- Utilization of industrial waste heat: gas-to-gas, gas-to-liquid and liquid-to-liquid heat recovery systems.
- Heat Recovery systems;

**M. E. Computer Engineering (PART TIME) With Specialization in Software Engineering
Curriculum & Syllabus**

S. No.	Category	No. of Credits					
		SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI
1.	Course Compulsory	10	5	10	5		
2.	Generic Elective	4	-	4	-		
3.	Programme Elective	-	5	-	5		
4.	Skill development	-	2	-	2		
5.	Seminar/ Workshop/ Research Tool	-	2	-	2		
6.	Dissertation Phase		-		-	12	12
Actual Credits per semester		14	14	14	14	12	12
Total actual Programme Credits per semester							80
7.	Virtual Credited Comprehensive Viva	2	2	2	2	4	4
Total Credits per semester		16	16	16	16	16	16
Total Programme Credits per semester							96

M. E. Computer Engineering (PART TIME) With Specialization in Software Engineering Curriculum & Syllabus

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	SEP1C1	Advanced Algorithms	3-1-1	PC1
2.	SEP1C2	Object Oriented Analysis & Design	3-1-1	PC2
3.	SEP1Gx	Generic Elective I	3-1-0	GE1
4.	SEP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II			L-T-P	
1.	SEP2C3	Software Construction	3-1-1	PC3
2.	SEP2Ex	Elective I	3-1-1	PE1
3.	SEP2W1	Seminar/ Workshop/Research Tool	0-2-0	
4.	ASP2S1	Soft Skills -1	2-0-0	
5.	SEP2V2	Comprehensive Viva II	0-0-2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
		List of Generic Elective I	L-T-P	
1.	SEP1G1	Soft Computing	3-1-0	
2.	SEP1G2	Distributed Operating System	3-1-0	
3.	SEP1G3	Advance Computer Architecture	3-1-0	
		List of Elective I	L-T-P	
1.	SEP2E1	Database Engineering	3-1-1	
2.	SEP2E2	Big Data Analytics	3-1-1	
3.	SEP2E3	Secure Software Engineering	3-1-1	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1C1	L	T	P	L	T	P	Total
Advanced Algorithms	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

Prerequisites: Data Structures and Algorithms.

COURSE CONTENTS

UNIT - I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

UNIT - II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Travelling Salesperson Problem (TSP), etc.

Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

UNIT - III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

UNIT - IV

Introduction to string matching problem, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc. Applications in Bioinformatics.

Computational Geometry: Convex Hull. Line-segment Intersection. Sweep Lines. Voronoi Diagrams. Range Trees. Seidel's Low-dimensional LP Algorithm.

UNIT - V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Learning Outcomes:

Upon Completing the Course, Student will have:

- Skills to analyze algorithms
- Comparative judgments of different design techniques
- Ability to solve real world problems
- Idea about the hardness of some well-known problems including TSP, vertex cover, network flow and combinatorial optimization problems.
- Familiarity with active research areas in connection with the study of algorithms.

BOOKS RECOMMENDED:

- [1] T. Cormen, C. Leiserson, R. Rivest, and C. Stein. **Introduction to Algorithms**. (3rd Ed). MIT Press, McGraw-Hill, 2010.
- [2] M.T. Goodrich, R. Tamassia, “Algorithm design – Foundations, Analysis, and Internet Examples”, John Wiley, Second Edition.

LIST OF PRACTICAL ASSIGNMENTS:

Practical assignments will be based on:

- Performance analysis
- Solving problems using design techniques discussed
- Solution of network flow problems
- Approximation algorithms
- String matching algorithms
- Combinatorial optimization problems
- TSP problem
- solving some real world problems using the skill gained in the course
- study of NP-Complete, NP-Hard problems
- Any other emerging/ active research problems in the area in consultation with the instructor.

Learning Outcomes:

Upon Completing the Course, Student will have:

1. Skills to analyze algorithms
2. Comparative judgments of different design techniques
3. Ability to solve real world problems

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1C2	L	T	P	L	T	P	Total
Object Oriented Analysis and Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course offers the opportunity to students to become skilled at the object oriented analysis and design. This is essential as it is the core of the software development process. This course shall help the student to comprehend the principles of object orientation and apply them as the solution for the real life problems in the form of object oriented design. At the end of the course the students shall be able to design a solution which works and solves software development problems.

Pre requisites:

- Programming knowledge in any of the object oriented languages like C++, Java.
- Familiarity and ease with data structures.

Unit I: Introduction to Modelling and UML 2.X

Importance of Modelling, Principles of Modelling, Object Oriented Modelling, Conceptual model of the UML, Architecture, Software Development Life Cycle

Unit 2: Basic and Advanced Structural Modelling

Basic Structural Modelling: Classes, Relationships, Common Mechanisms and Diagrams.

Advanced Structural Modelling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages

Unit 3: Class & Object Diagrams

Class & Object Diagrams: Terms, Concepts, Modelling Techniques for Class and Object Diagrams

Unit 4: Basic Behavioural Modelling

Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Events and Signals, State Machines, Processes and Threads, Time and Space Diagram, State Chart Diagrams

Unit 5: Architectural Modelling

Architectural Modelling: Component, Deployment, Component Diagrams and Deployment Diagrams, Case Study, Issues in OO Testing

TEXT BOOKS:

- Grady Booch, James Rumbaugh, IvarJacobson : The Unified Modeling Language User Guide, Pearson Education.
- Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

- [1] Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
- [2] Pascal Roques: Modelling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
- [3] AtulKahate Object Oriented Analysis & Design, The McGraw-Hill Companies.
- [4] Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

Learning Outcomes

- Students become skilled at the object oriented analysis and design. This is essential as it is the core of the software development process. student will be comprehend the principles of object orientation and apply them as the solution for the real life problems in the form of object oriented design. Students shall be able to design a solution which works and solves software development problems

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP2C3	L	T	P	L	T	P	Total
Software Construction	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Outcomes:

The aim of the course is to help the student be able to understand the real world problems. The student shall be able to solve the complexity of the problem and also depict the problem with the help of standard UML diagrams. In the process of software design the student shall be able to appreciate the application of diagrams, iterative approach which helps in improving the software quality.

Objective: To gain the knowledge for advance programming using JAVA

UNIT I

Object Oriented Concepts, Merits of Object Oriented Technology. Introduction to JAVA and its applications on the Internet. Constructors & constructor overloading, Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT II

Introduction to Java classes and objects, Java features, data types data type conversions & control statements Operators and their precedence. Introduction to Class, Instance members and member functions.

UNIT III

String Handling, Wrapper classes Arrays and Vectors Inheritance and Polymorphism

Class relationships Inheritance and its types Merits and Demerits of Inheritance Introduction to Association, inheritance Polymorphism Dynamic method dispatch Runtime polymorphism Abstract classes, Interfaces packages

UNIT IV

Java I/O, Basic concept I/O stream reader-writer Exceptions: Need for exceptions Checked exceptions Unchecked exceptions Creating exceptions Multithreading Introduction, Priorities and scheduling of Threads Thread Synchronization and its life cycle Applet and its Life Cycle

UNIT V

Server side programming:- Java servlets, Java Server pages, Web application development using Java, Database handling with Java.

Text Books:

[1] : Herbert Schildt, Java: The Complete Reference, 8th Edition

[2] : Programming with java by e Balagurusamy

Learning Outcomes:

- The aim of the course is to help the student be able to understand the real world problems. The student shall be able to solve the complexity of the problem and also depict the problem with the help of standard UML diagrams. In the process of software design the student shall be able to appreciate the application of diagrams, iterative approach which helps in improving the software quality.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1G1	L	T	P	L	T	P	Total
Soft Computing	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize with neural networks and learning methods for neural networks.
- To introduce basics of genetic algorithms and their applications in optimization and planning.
- To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
- To develop skills thorough understanding of the theoretical and practical aspects of Soft Computing.

Pre requisites: Analysis of Algorithm, Artificial Intelligence.

COURSE CONTENTS

UNIT-I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing ,Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

UNIT-II

NEURAL NETWORKS:Backpropagation Networks, Architecture: perception model, single layer artificial neural network, multilayer perception model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

UNIT-III

GENETIC ALGORITHMS

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation,

Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems. Simulated annealing and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

UNIT-IVFUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfication&Defuzzification, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-VNEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification , Neuro Fuzzy Control , Case studies.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Identify and describe soft computing techniques and their roles in building intelligent machines.
- Apply neural networks to pattern classification and regression problems
- Recognize the feasibility of applying a soft computing methodology for a particular problem
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- Apply genetic algorithms to combinatorial optimization problems.

BOOKS RECOMMENDED:

[1] S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.

[2] Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.

[3] Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence - Bart Kosko, Prentice Hall, 1992.

[4] Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.

[5] David E. Goldberg, “Genetic Algorithms in search, Optimization & Machine Learning” , Addison-Wesley, 1997.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply neural networks to pattern classification and regression problems
3. Recognize the feasibility of applying a soft computing methodology for a particular problem
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1G3	L	T	P	L	T	P	Total
ADVANCE COMPUTER ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize with current trends in high performance computing.
- To introduce quantitative analysis of computer architectures

Pre requisites: Computer organization

COURSE CONTENTS

Unit 1 : Introduction to Computer Architecture & Quantitative Analysis

Generations of Computers, Definition of Computer Architecture, General trends in technology, power and cost. Measuring, Reporting, and Summarizing performance. Quantitative principles of computer design.

Unit 2 : Pipelining & Instruction level Parallelism

Need of pipelining, Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards, pipeline extension to support multicycle operations. Concepts and challenges in ILP, Compiler techniques for ILP, Dynamic Scheduling, and Hardware based Speculation, Combining dynamic scheduling, multiple issue and speculation.

Unit 3: Memory Hierarchy Design

Introduction, Optimizations for improving Cache performance, Memory technology and optimizations, Virtual Memory protection and performance issues, Virtual machines protection.

Unit 4: Data level Parallelism and Thread level Parallelism

Introduction, Vector architecture, Graphics Processing Units, Detecting and enhancing loop-level parallelism, Centralized shared memory architecture, Shared Memory multiprocessors performance, distributed shared memory and directory-based coherence, models of memory consistency.

Unit 5: Interconnection Networks

Introduction, Connecting two or more devices, network topology, network routing, arbitration, and switching, Examples of interconnection networks, internetworking issues.

Case Study: MIPS Processor

Books Recommended

- [1] J. Hennessy & D. Patterson, Computer Architecture : A Quantitative Approach, Morgan Kaufmann Series, 5th Edition, 2011.
- [2] Kai Hwang, Advance Computer Architecture: Parallelism, Scalability, Programmability, Mcgraw Hill Computer Science Series, 1992.
- [3] D. Sima& T. Fountain & P. Kacsuk, Advance Computer Architectures : A Design Space Approach, 1st Edition, Pearson Education, 2002.
- [4] J. Hayes, Computer Architecture and Organization, Mcgraw Hill Education Series (India), 2012.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Learn the current trends in high performance computing.
- Learn the quantitative analysis of computer architectures
- Learn about Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards
- Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards
- Vector architecture, Graphics Processing Units, Detecting and enhancing loop-level parallelism,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP2E1 DATABASE ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand how transactions are executed and concurrency mechanisms are used in practice.
- To understand how DBMS process queries and how it estimates the cost of query optimization.
- To understand how DBMS maintains data records and access paths.
- To understand the need and use of distributed database systems in practice.
- To familiarize with the emerging technologies of databases.

Prerequisites: Introductory knowledge of Database Systems.

COURSE CONTENTS

Unit-I

Transaction Processing & Concurrency Control: Introduction to Transaction Processing, Transaction Properties, Transaction recoverability and serializability, Transaction Support in SQL, Introduction to Concurrency Control, Two-phase locking, Timestamp ordering, Validation and other issues.

Unit-II

Query Processing & Optimization: Introduction, Translating SQL queries, Algorithms – External Sorting, Select, Join and Project operations, Aggregate and Outer Joins, Heuristics for Query optimization, Estimating cost in query optimization, Semantic optimization, Optimization used in practice.

Unit-III Data Storage and Querying: File organization, Organization of records, Indexing and Hashing – Basic concepts, B+-tree index files, Static and dynamic hashing, comparison of indexing and hashing etc..

Unit-IV

Distributed Databases : Concepts, Techniques for Distributed database design – Data fragmentation, replication, and allocation techniques; Types of Distributed Systems, Query processing in Distributed Databases, Concurrency control & Recovery in Distributed Databases, Distributed Databases in MySQL.

Unit-V

Advance Topics: Information Retrieval and XML data, Spatial data management, NoSQL – Differences from Relational Databases, Theory, Key-Value Databases, Graph Databases etc.

Books Recommended:

- [1] Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
- [2] Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
- [3] Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
- [4] Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.

List of Assignments:

During the learning of course, students need to do assignments:

- Solving intermediate SQL queries involving join expressions, views and transaction support.
- Using PL/SQL constructs involving procedures, triggers, recursive queries etc.
- Assignment on Query processing and indexing.
- Using concurrency and transactions
- Distributed database support in MySQL or PostgreSQL.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand how transactions are executed and concurrency mechanisms are used in practice.
- Understand how DBMS process queries and how it estimates the cost of query optimization.
- Understand how DBMS maintains data records and access paths.
- Understand the need and use of distributed database systems in practice.
- Understand and familiarize with the emerging technologies of databases.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP2E2	L	T	P	L	T	P	Total
Big Data Analytics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

LEARNING OBJECTIVES:

- To increase knowledge of the Big Data landscape.
- Develop a comprehensive knowledge R and to use R for effective data analysis.
- Develop skills in independent managing Big data projects and related issues.
- Develop ability to carry out research in area of Big Data.

Pre requisites: Some programming experience (in any language) is recommended.

COURSE CONTENTS

UNIT-I

Introduction to Big Data :Overview of Big Data, Characteristics of Big Data, Sources of Big data, Five V's of Big Data, Examples of Big Data, Advantagesof Big Data, Big Data Applications, Strategies of Big Data, challenges Process of Data Analysis.

UNIT II

Introduction R : Overview and History of R, R Console Input and Evaluation, Data Types - R Objects and Attributes, Vectors and Lists, Matrices, Factors, Missing Values, Data Frames, Names Attribute, Reading Tabular Data, Reading Large Tables, Textual Data Formats, Connections: Interfaces to the Outside World.

Unit III

Programming with R: Subsetting – Basics, Lists, Matrices, Partial Matching, Removing Missing Values, Vectorized Operations. Control Structures - If-else, For loops, While loops, Repeat, Next, Break, Functions, Scoping Rules - Symbol Binding, R Scoping Rules, Coding Standards, Dates and Times

Unit IV

Loop Functions and Debugging :Loop Functions – lapply, apply, mapply, tapply, split, Debugging Tools - Diagnosing the Problem, Basic Tools, Using the Tools

Unit V

Developing Data Products: Introduction to Data Products, Intro to rCharts and GoogleVis, rCharts introduction, rCharts examples, rCharts mapping, GoogleVis, plotly, Interactive graphics

LEARNING OUTCOMES:

Upon completing the course, students will be able to:

- Apply Knowledge of Big Data to solve real world big data problems.
- Understand the fundamentals of 'R' programming
- Work on a real life Project, implementing R Analytics to create Business Insights.
- Apply Data Visualization to create fancy plots
- Undergo into further research in Big Data.

BOOKS RECOMMENDED:

[1] Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Michael Minelli, Michele Chambers, AmbigaDhira, Wiley India Pvt Ltd, 2013.

[2] R for Everyone: Advanced Analytics and Graphics, 1st Ed., Jared P. Lander, Pearson Education, Inc., 2014.

[3] Big Data Analytics with R and Hadoop, Vignesh Prajapati, Packt Publishing Ltd, 2013.

[4] Big Data Analytics: Turning Big Data into Big Money, Frank J. Ohlhorst, Wiley, 2012.

[5] Creating Value with Big Data Analytics: Making Smarter Marketing Decisions, Peter C. Verhoef, Edwin Kooge, Natasha Walk, Taylor & Francis, 2016.

List of Practical/ Programming Assignments: (if applicable)

During the learning of course, students need to do assignments:

- To learn the R Programming language.
- To explore Rstudio for solving the Big data problems.

**ME (Information Technology) with Specialization in Information Security
Proposed Scheme for CBCS (Part Time)**

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	ISP1C1	Advanced Algorithms	3-1-1	PC1
2.	ISP1C2	Secure Computing Techniques	3-1-1	PC2
3.	ISP1Gx	Generic Elective I	3-1-0	GE1
4.	ISP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
			L-T-P	
1.	ISP2C3	Advanced Computer Networks	3-1-1	PC3
2.	ISP2EX	Elective I	3-1-1	PE1
3.	ISP2W1	Seminar/ Workshop-I	0-2-0	
4.	ISP2V2	Comprehensive Viva II	0-0-2	
5.	ASP2S1	Soft Skills-1	2-0-0	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I			L-T-P	
1.	ISP1G1	Advanced Data Base Management Systems	3-1-0	
2.	ISP1G2	Complexity of Security Algorithms	3-1-0	
3.	ISP1G3	Agent Technology	3-1-0	
List of Elective I			L-T-P	
1.	ISP2E1	Data Security	3-1-1	
2.	ISP2E2	Information Theory and Coding	3-1-1	
3.	ISP2E3	Data Compression and Stagnography	3-1-1	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP1C1: Advanced Algorithms	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

COURSE CONTENT

Unit I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

Unit II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Travelling Salesperson Problem (TSP), etc. Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

Unit III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

Unit IV

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

Unit V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Text and Reference books:

- [1] T. Cormen, C. Leiserson, R. Rivest, and C. Stein. Introduction to Algorithms. (3rd Ed). MIT Press, McGraw-Hill, 2010.
- [2] M.T. Goodrich, R. Tamassia, “Algorithm design – Foundations, Analysis, and Internet Examples”, John Wiley, Second Edition.
- [3] V. V. Vazirani, Approximation Algorithms, Springer. 2001.
- [4] Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, Network Flows: Theory, Algorithms, and Applications,
- [5] E Horowitz, S salmi, S Rajasekaran, “Fundamentals of Computer Algorithms”, Second Edition, University Press, 2007.
- [6] Aho, A V Hopcraft Ullman JD, “The Design and analysis of computer Algorithms”, Pearson Education,

Course outcomes:

After the completion of course student will be able to :

Perform variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarize the state of the art in some areas of algorithmic research, including open problems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP1C2: Secure Computing Techniques	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

This course aims to provide an understanding of the various security attacks and knowledge to recognize and remove common coding errors that lead to vulnerabilities. It gives an outline of the techniques for developing a secure application.

COURSE CONTENT

Unit-I: Introduction

Security: CIA (AIC) Triad, Viruses, Trojans, and Worms In a Nutshell, Security Concepts- exploit, threat, vulnerability, risk, attack. *Malware Terminology:* Rootkits, Trapdoors, Botnets, Key loggers, Honeypots. Active and Passive Security Attacks, IP Spoofing, Tear drop, DoS, DDoS, XSS, SQL injection, Smurf, Man in middle, Format String attack. *Types of Security Vulnerabilities:* buffer overflows, invalidated input, race conditions, access-control problems, weaknesses in authentication, authorization, or cryptographic practices. Access Control Problems.

Unit-II: Secure Software Development Cycle & Threat Modelling

Need for Secure Systems: Proactive Security development process, Secure Software Development Cycle (S-SDLC) , Security issues while writing SRS, Design phase security, Development Phase, Test Phase, Maintenance Phase, Writing Secure Code – Best Practices SD3 (Secure by design, default and deployment), Security principles and Secure Product Development Timeline.

Identifying the Threats by Using Attack Trees and rating threats using DREAD, Risk Mitigation Techniques and Security Best Practices. Security techniques, authentication, authorization. Defence in Depth and Principle of Least Privilege.

Unit – III: Secure Coding Techniques

Protection against DoS attacks, Application Failure Attacks, CPU Starvation Attacks, *Insecure Coding Practices in Java Technology:* ARP Spoofing and its countermeasures. Buffer Overrun- Stack overrun, Heap Overrun, Array Indexing Errors, FormatString Bugs. *Security Issues in C/C++ Language:* String Handling, Avoiding Integer Overflows and Underflows and Type Conversion Issues- Memory Management Issues, Code Injection Attacks, Canary based countermeasures using StackGuard and Propolice. Socket Security, Avoiding Server Hijacking, Securing RPC, ActiveX and DCOM. Secure coding issues in Android Applications, Language Specific issues like C/C++, Perl, Python, Scripting Languages, Ada, Java, PHP etc.

Unit – IV: Database and Web-specific issues

SQL Injection Techniques and Remedies, Race conditions, Time of Check Versus Time of Use and its protection mechanisms. Validating Input and Interprocess Communication, Securing Signal Handlers and File Operations. XSS scripting attack and its types – Persistent and Non persistent attack XSS Countermeasures and Bypassing the XSS Filters.

Unit – V: Testing Secure Applications

Security code overview, secure software installation. The Role of the Security Tester, Building the Security Test Plan. Testing HTTP-Based Applications, Testing File-Based Applications, Testing Clients with Rogue Servers.

Text and Reference books:

- [1] Writing Secure Code, Michael Howard and David LeBlanc, Microsoft Press, 2nd Edition, 2004
 - [2] Buffer Overflow Attacks: Detect, Exploit, Prevent by Jason Decker, Syngress, 1st Edition, 2005
 - [3] Threat Modeling, Frank Swiderski and Window Snyder, Microsoft Professional, 1st Edition, 2004.
 - [4] Secure Programming HOWTO by David A. Wheeler
- Secure Coding: Principles & Practices by Mark G. Graff, Kenneth R. van Wyk

Course outcomes:

After the completion of course student will be able to:

Have understanding of the various security attacks and knowledge to recognize and remove common coding errors that lead to vulnerabilities. It gives an outline of the techniques for developing a secure application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP2C3: Advanced Computer Networks	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours				3	1	1	5

Course Objective:

Provide students with enhance base of knowledge of Computer Networks, Develop a comprehensive knowledge of Tools and Techniques used in Management of Computer Networks, Develop skills in independent managing Network Performance related issues Develop ability to carry out research in area of Computer Networks

COURSE CONTENT

Unit I : Foundation

Computer Networks and Internet, Structure of network software in an operating system, Packet Switching and Circuit Switching, Protocols Layers and Network Service Models, Implementing Network Software (Sockets), Network Performance - Delay, Loss , Throughput, and Bandwidth, Best-effort services and QoS guarantees for multimedia data.

Unit II : Link Layer, Access Networks and LANs

Services Provided by Link Layer, Link Layer Implementation, Multiple Access Protocols and Ethernet, Switched Local Area Networks, Link Layer Addressing (ARP), RARP, VLANs, Link Virtualization and MPLS, Data Center Networking

Unit III : Network Layer and Internetworking

Virtual Circuit and Datagram Networks, Internet Protocol, IPV4 -Class full and Classless Addressing, Subnetting, IPV6 Addressing, IP Datagram delivery and forwarding, Routing Algorithms- Distance Vector and RIP, Link State Routing and OSPF, Inter domain Routing - BGP, DHCP, ICMP, Router-switching, input/output processing, Routing Control Plane, Network Virtualization- VPN and NAT.

Unit IV : Transport Layer and End-to-End Protocols

Transport layer services in Internet, Multiplexing and De-multiplexing, Connectionless Transport: UDP segment format and checksum, Connection Oriented Transport: TCP-segment format, roundtrip estimation and Timeout, Reliable data Transfer, Flow control, TCP connection Management, TCP congestion control Additive Increase/Multiplicative Decrease, Slow start, Fast Retransmit and Fast Recovery, Fairness and Queuing Disciplines.

Unit V : Application Layer

Network Application Architecture and Process Communication, Web and HTTP, File Transfer FTP, Electronic Mail- SMTP, POP, IMAP, MIME, Internet Discovery Service-DNS, Network Management – SNMP, Advance topics - Software Defined Networking, Internet of Things

Text and Reference books:

Computer Networking, A Top-Down Approach, 6th Ed., J. Kurose and K. Ross, Pearson, 2013.
 Computer Networks, A Systems Approach, 5th Edition, L. Peterson and B. Davie, Morgan Kaufman, 2012.
 Internetworking with TCP/IP Volume I, 6th Ed., D. E. Comer, Pearson Education, 2013.
 Internetworking with TCP/IP Volume II, 3rd, Ed., D. E. Comer and David L. Stevens, Pearson Education, 2003.
 Data Communications and Networking, 4th Ed., Beharouz A. Forouzan, McGraw-Hill Education Private Ltd., 2006.

Course outcomes:

After the completion of course student will be able to:

Enhance base of knowledge of Computer Networks, Develop a comprehensive knowledge of Tools and Techniques used in Management of Computer Networks, Develop skills in independent managing Network Performance related issues Develop ability to carry out research in area of Computer Networks

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP1G1: Advanced Database Management Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

To enhance the understanding of practical issues related to advance topics of Database systems.

COURSE CONTENT

Unit I : Introduction to Data Warehousing and Data Mining

Introduction to Knowledge discovery process, OLTP, OLAP, Data Mining: Functionalities, Process, Schemas and Applications etc.; Data Warehouse : Construction and other issues.

Unit II : Transaction Processing and Concurrency Control

Introduction, Properties; Schedules, Types of Schedules, Characterizing Schedules, Serializability, Two-phase locking, Dealing with Deadlock and Starvation, Time Stamp Ordering and Multi version Concurrency control etc.

Unit III : Data Storage, Indexing and Physical Database Design

Types of Files, Introduction to Hashing, Multilevel Indexes, B-trees, B+ -trees, Indexes on Multiple Keys, Overview of Physical Database Design and Database Tuning in Relational Databases

Unit IV : Query Optimization

Introduction to Query Optimization, Overview of algorithms used in External Sorting and other SQL operations, Use of Heuristics, Cost Estimation and Selectivity used in Query Optimization, Semantic Query Optimization etc.

Unit V : Distributed Databases and Security

Concepts, Types and Query Processing in Distributed Databases, Data Fragmentation, Replication and Allocation Techniques, Introduction to Database Security Issues, Access Control Policy, Statistical Database Security etc.

Text and Reference books:

1. Fundamentals of Database Systems, Elmasri and Navathe, Pearson Education, 6th Edition, 2014.
2. Data Mining Concepts and Techniques, Han and Kamber, Morgan Kauffman, 3rd Edition, India, 2012.
3. Database System Concepts, Silberchatz, Korth, Sudarshan, Mcgraw Hill, 6th Edition, 2010.
4. Database Systems : A practical Approach to Design, Implementation, and Management, Connolly and Begg, Pearson Education, 6th Edition, 2014.

Course outcomes:

After the completion of course student will be able to:

- To enhance the understanding of practical issues related to advance topics of Database systems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP2E1: Data Security	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Foundation

Security Taxonomy, Domain of information security, security goals, security approaches, principles of security, security attacks, threats, vulnerabilities, malicious software's, virus, worms, Trojan, spy wares, Applets/Active X, cookies. Security services, mechanisms and security models. Types of attacks, packet sniffing, packet spoofing, IP sniffing, IP spoofing, DNS spoofing attack.

Unit II : Classical Cryptographic Techniques

Cryptography terminologies, classical cryptography: substitution techniques, transposition techniques, playfair cipher, Hill cipher. Mathematics of cryptography: Integer arithmetic, modular arithmetic, Euclid theorem, Concept of symmetric and asymmetric key cryptography, stenography, digital watermarking, key range and size, possible types of attacks. Stream ciphers and Block cipher. Algorithm type and modes. Key distribution, Diffie Hellman key exchange, Man in the middle attack.

Unit III : Symmetric Key Cryptography

Computer based symmetric key cryptographic algorithms: Data Encryption Standard (DES), Double DES, meet in the middle attack, Triple DES, International Data Encryption Algorithm (IDEA), RC5, Blowfish, Advance Encryption Standard (AES).

Unit IV : Asymmetric Key Cryptography

Random number generation, Prime numbers. Fermat's and Euler's theorem. Principles of public key crypto systems. Computer based asymmetric key cryptographic algorithms: RSA algorithm. Principles of public key cryptosystems, symmetric and asymmetric key cryptography together. Concept of Digital Envelope, Digital signatures, message digests and its requirements.

Unit V : Public Key Cryptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.

Text and Reference books:

- [1] Douglas R. Stinson, "Cryptography Theory and Practice"; Chapman & Hall/CRC
 - [2] Williams Stallings; "Cryptography & Network Security"; Pearson Education.
 - [3] Mathew Bishop; Introduction to computer Security; Addison-Wisley
- Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Course outcomes:

After the completion of course student will be able to:

Get the knowledge of encryption and decryption techniques and their applications in managing the security of data.

M. E. Electronics (Specialization in Digital Instrumentation)

(PART TIME) Curriculum & Syllabus

Batch 2015– 2016 and onwards

S. No.	Category	No. of Credits					
		SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI
1.	Course Compulsory	10	5	10	5		
2.	Generic Elective	4	-	4	-		
3.	Programme Elective	-	5	-	5		
4.	Skill development	-	2	-	2		
5.	Seminar/ Workshop	-	2	-	2		
6.	Dissertation Phase		-		-	12	12
Actual Credits per semester		14	14	14	14	12	12
Total actual Programme Credits per semester							80
7.	Virtual Credited Comprehensive Viva	2	2	2	2	4	4
Total Credits per semester		16	16	16	16	16	16
Total Programme Credits per semester							96

M.E Electronics (Specialization Digital Instrumentation) (Part Time)

Proposed Scheme for CBCS

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-I	SubType
1.	DIP1C1	Industrial Transducer & Smart Sensors	3-1-1	PC1
2.	DIP1C2	Embedded System using ARM Microcontroller	3-1-1	PC2
3.	DIP1GX	Generic Elective I	3-1-0	GE1
4.	DIP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
1.	DIP2C3	Modern Control System	3-1-1	PC3
2.	DIP2EX	Elective I	3-1-1	PE1
3.	ASP2S1	Soft Skill 1	2-0-0	
4.	DIP2W1	Seminar / Workshop / Research Tool	0-2-0	
5.	DIP2V2	Comprehensive Viva II	0-0-2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I				
1.	DIP1G1	Advance System Design	3-1-0	
2.	DIP1G2	Wireless Sensor Network	3-1-0	
3.	DIP1G3	Advanced Communication Networks	3-1-0	
4.	DIP1G4	Medical Instrumentation	3-1-0	
List of Elective I				
1.	DIP2E1	Fuzzy Logic & Neural Network	3-1-1	
2.	DIP2E2	Object Oriented Programming	3-1-1	
3.	DIP2E3	Nano Devices and Nano sensors	3-1-1	
4.	DIP2E4	Advance Digital Signal Processing	3-1-1	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP1C1: Industrial Transducers and smart Sensors	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

Acquire the knowledge of basic principles of sensing various parameters. Learn comparative methods of selection of sensors for typical applications

COURSE CONTENT

Unit I

Temperature Measurement: Classification of temperature sensors, working principle, types, materials, Non electrical sensors (thermometer, thermostat), electrical sensors (RTD, thermocouple, thermistors), radiation sensors (pyrometers), temperature switch.

Pressure Measurement: Definition, working principle, types, materials, manometers, elastic pressure sensors, secondary pressure sensors, differential pressure sensors, force balance type, motion balance type, capacitive (delta cell), ring balance, vibrating cylinder type, high-pressure sensors, low-pressure sensors, pressure switch.

Unit II

Level Measurement: Working principle, types, materials, float, displacers, bubbler, and DP- cell, ultrasonic, capacitive, microwave, radar, radioactive type, laser type transducers, level gages, resistance, thermal, TDR/ PDS type, solid level detectors, fiber optic level detectors, level switch.

Flow Measurement: Working principle, types, materials, primary or quantity meters (positive displacement flow meter), secondary or rate meter (obstruction type, variable area type), electrical flow sensors (turbine type, electromagnetic type, and ultrasonic type), Flow switch.

Unit III

Force and Torque Measurement: Basic methods of force measurement, elastic force traducers, strain gauge, load cells, shear web, piezoelectric force transducers, vibrating wire force transducers, strain gauge torque meter, Inductive torque meter, magneto-strictive transducers, torsion bar dynamometer, etc. Dynamometer (servo control and absorption) instantaneous power measurement and alternator power measurement.

Unit IV

Allied Sensors: Standards, working principle, types, materials, design criterion: LLeak detector, flame detector, smoke detector, humidity, density, viscosity sensors, and digital transducers, sound sensors, and proximity sensors. **Advanced sensors:** Working Principle, types, materials: Smart sensors, MEMS, nano sensors IC sensors, optical fiber sensors.

Unit V

Industrial Communication Systems: Introduction to interface, fieldbus, PROFIBUS-PA, foundation fieldbus.

Text and Reference books:

- [1] B. C. Nakra and K. K. Choudhari, "Instrumentation Measurements and Analysis", Tata McGraw Hill Education, Second ed., 2004.
- [2] Sabrie Soloman, "Sensors Handbook", McGraw Hill Publication, First ed., 1998.
- [3] A. K. Sawhney, "Electrical & Electronic Instruments & Measurement", Dhanpat Rai and Sons, Eleventh ed., 2000.
- [4] Dr. D. S. Kumar, "Mechanical Measurements and Control", 3/e, Reprint-2004, Metropolitan Book Co. Private Ltd., 2004.
- [5] B. E. Noltingk, "Instrumentation Reference Book", 2nd Edition, Butterworth Heinemann, 1995.

Course Outcomes:

After the completion of Course student will be able to:

They can perform the analysis on pressure measurement and temperature measurement.

They can make industry oriented research on the various topics covered in the various topics

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP1C2: Embedded System using ARM Microcontroller	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller- based embedded systems. High-level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects.

Prerequisite: Knowledge of Microprocessor and C++ Programming

COURSE CONTENTS

Unit I

Introduction: Definition of embedded system, embedded systems vs general computing systems, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, core of the embedded system: general purpose and domain specific processors, embedded system architecture: RISC and CISC, RISC: Introduction of ARM processors, evolution of ARM, ARM design philosophy, ARM processor fundamentals: data flow model, registers, program status register, pipeline, interrupts and vector table, ARM processor families and nomenclature.

Unit II

ARM Basic Instruction Set: Introduction to 32 bit programming, instruction set, architecture of ARM, addressing modes, data processing instructions, branch instructions, load and store instructions, conditional instructions, PSR instructions, stack instructions.

Unit III

ARM Thumb Instruction Set: Overview, branch instructions, data processing instructions, status register access instructions, single register load and store instructions, multiple register load and store instructions, semaphore instructions, coprocessor instructions, stack instructions, interrupt instructions.

UNIT IV

ARM Programming: Assembly language programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, register allocation, conditional execution and loops. C programming for ARM: Simple C program using function, pointers, structures, etc, exception handling, interrupts, interrupt handling schemes.

Unit V

Interfacing and Applications: Programs for LCD display, PWM, ADC, DAC application, measurement and control of physical parameter as temperature, stepper motor control, DC motor control etc.

Text and Reference Books:

- [1] Andrew N. Sloss , "ARM System Developer's Guide Designing and Optimizing System Software", Elsevier publication, 2004.
- [2] Par Furber, "Arm System-On-Chip Architecture", 2/E , Pearson Education Limited, 2000.
- [3] Par Santanu Chattopadhyay, "EMBEDDED SYSTEM DESIGN", PHI Learning Private Ltd., 2013.
- [4] Jonathan W. Valvano, "Embedded Microcomputer Systems, Real Time Interfacing, Brookes /Cole, 1999, Thomas Learning.

Course Outcomes:

After the completion of Course student will be able to:

They can perform the analysis on different types of application development process like LCD display etc. They can make industry oriented research on the various topics with the help of Assembly language programming and other technology used in the syllabus.

Well understanding of architecture of ARM will be developed that will be help full in future development

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIP1G1: Advance System Design		L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Course Objective:

To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite:

Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit I

Introduction to digital IC design – full Custom and semi-custom design flow and comparison, Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit II

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional Unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design- Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit III

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit IV

Subsystem design principles pipelining - Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model- Technology scaling effect on interconnect and - Noise in interconnects.

Unit V

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

Text and Reference Books:

- [1] John M Yarbrough, "Digital Logic Applications and Design", Thomson learning
- [2] Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata Mc Graw Hill Edition
- [3] Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005
- [4] Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer, Third edition, 1999.

Course Outcomes:

After the completion of Course student will be able to:

FPGA Programming technologies will be help full in research and development as per the industry requirement.

They will perform the high level synthesis on different types of application like Scheduling and allocation- ASAP and ALAP etc.

They can make industry oriented research that will be helpful in making future required products with the help of programming and other technology used in the syllabus.

Well understanding of subsystem design principles will be developed that will be help full in development of the application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP1G2: Wireless Sensor Networks	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objectives: To list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks, and propose, implement, and evaluate new ideas for solving wireless sensor network design issues.

COURSE CONTENTS

Unit I

Introduction and Overview of Wireless Sensor Networks: Introduction, Brief Historical Survey of Sensor Networks, and Background of Sensor Network Technology, AdHoc Networks, Applications of Wireless Sensor Networks: Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology, Basic Sensor Network Architectural Elements, Home Control, Medical Applications, Basic Wireless Sensor Technology : Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Network Standards: IEEE 802.15.4, ZigBee, IEEE 1451

Unit II

Medium Access Control Protocols for Wireless Sensor Networks: Introduction, Background, Fundamentals of MAC Protocols, MAC Protocols for WSNs: Schedule-Based Protocols, Random Access-Based Protocols, Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange (B - MAC, Box-MAC, Bit-MAC, H-MAC, I-MAC, O-MAC, S-MAC, Ri-MAC, T-MAC, Q-MAC (Query MAC), Q-MAC (QoS MAC), X-MAC

Unit III

Routing Protocols for Wireless Sensor Networks: Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing

Unit IV

Transport Control Protocols and Middle wares for Wireless Sensor Networks: Traditional Transport Control Protocols: TCP (RFC 793), UDP (RFC 768), Mobile IP, Introduction, WSN Middleware Principles, Middleware Architecture: Existing Middleware: MiLAN (Middleware Linking Applications and Networks), IrisNet (Internet-Scale Resource-Intensive Sensor Networks Services)

Unit V

Operating Systems for Wireless Sensor Networks: Introduction, Examples of Operating Systems: TinyOS, Mate, MagnetOS

Text and Reference Books:

- [1] Wireless Sensor Network by KazemSohraby, Daniel Minoli, TaiebZnati Pub: Wiley.
- [2] Wireless Sensor Networks Signal Processing andCommunications by Ananthram Swami, Qing Zhao, Yao- Win Hong, Lang Tong Pub: John Wiley & Sons.
- [3] Ad Hoc Wireless Networks: Architectures And Protocols By Murthy Pub: Pearson Education
- [4] Wireless sensor networks Edited by C. S. Raghavendra Pub: Springer
- [5] Fundamentals of Sensor Network Programming: Applications and Technology By Sridhar S.lyengar, NandanParameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D. Okoye, Wiley

Course Outcomes:**After the completion of Course student will be able to:**

Deep study of wireless Sensor Networks technologies will be help full in research and development as per the industry requirement.

Student will have deep knowledge of Medium Access Control Protocols for Wireless Sensor Networks protocol as per the research and analysis requirement

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP1G3: Advanced Communication Networks	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Unit I

Fundamentals of communication Networks: Basics of optical communication and computer networking: services, switching, multiplexing schemes, telecom network overview and architecture, optical networks, WDM optical networks, WDM network evolution, WDM network construction, broadcast and select optical WDM network, Challenges of optical WDM network.

Unit II

Optical network Components: Optical transmitters, semiconductor laser diode, tunable and fixed laser, laser characteristics, photodetectors, tunable and fixed optical filters, optical amplifiers and its characteristics, semiconductor laser amplifier, Raman amplifier, doped fiber amplifier, various switching elements, OADM, OXC, architecture, MEMS, wavelength convertors, Couplers, isolators, circulators, optical line terminals, all optical cross connect configurations.

Unit III

Optical network architecture: Synchronous optical network/ synchronous digital heirarchy-elements, multiplexing, layers, SONET physical layer, frame structure, WDM network architectures, QoS parameters for optical networks, wavelength routed networks, routing and wavelength assignment (RWA), optical multicast routing, access networks.

Unit IV

Wavelength routing and Survivability: Classification of RWA algorithms, Problem formulation, routing sub- problem: fixed routing, fixed alternate routing, adaptive routing, fault tolerant routing, wavelength assignment sub-problem, wavelength reuse and conversion criterions, algorithms: flow deviation algorithm, fairness and admission control, restoration schemes, multiplexing schemes, provisioning restorable single fiber networks.

Unit V

Wireless adhoc networks: Introduction to ad-hoc networks, MAC Protocols for ad hoc networks, routing protocols, Transport layer, Cross layer design for ad hoc networks. Wireless sensor networks (WSN), MAC protocol for WSN, routing protocol, data management and security, applications

Text and Reference Books:

- [1] Optical networks – Apractical prespective : Rajiv Ramaswami and K N Sivarajan, Morgan Kaufmann Publishers, 2002.
- [2] WDM optical Networks: Concepts, Design and algorithms , C. Siva Ram Murthy and Mohan Gurusamy, PHI, 2011.
- [3] Mukherjee, B- Optical communication networks”, Mc-Graw Hill, New York,1997.
- [4] C. Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education, 2007.
- [5] C.S.Raghavendra Krishna, M.Sivalingam and Tarib znati, “Wireless Sensor Networks”, Springer publication, 2004.

Course Outcomes:

After the completion of course student will be able to:

- Well understanding of the concept of Basics of optical communication and computer networking for research and analysis will be developed.
- Application development using Optical network Components like Optical transmitters, semiconductor laser diode etc. will be developed

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP1G4: Medical Instrumentation	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objective: To understand the advanced biomedical instruments used in hospitals. To review the basic concept of medical Imaging systems. To understand the concept of various biomedical instruments and technologies.

COURSE CONTENT

Unit I

Basic Medical Instrumentation system, General Constraints in design of medical instrumentation system, Patient Safety, Automated Drug Delivery Systems, Blood and its composition and function, Blood Cell Counters, Pulse Oximetry, Introduction to telemetry & Telemedicine .

Unit II

X-ray machines, Dental X-ray machines, Digital Radiography, Principles and, System components of Tomography, Principles of NMR, its components and biological effects. Ultrasonic & Thermal imaging systems. CT Scanning, basic CT scanning system, Types of gantries, image reconstruction techniques in tomography, image artefacts, EEG and ECG

Unit III

Pacemaker – general description and instrumentation details, Types of pacemakers: External & Internal, Defibrillators: AC & DC Defibrillator, Heart Lung Machine. Diathermy: Electro surgical diathermy (ESU), Short wave, Microwave. Artificial Kidney, Dialyzers, Haemodialysis machine. Stone disease problem, lithotripter systems, Anesthesia machine, Mechanism of artificial ventilation, Types of Ventilator

Unit IV

Interaction of Lasers with Tissues -Thermal and Non thermal, Basic Endoscopes system & its characteristics, Laser Applications in ophthalmology- Diabetic Retinopathy , Glaucoma and Retinal hole and detachment treatment , Dermatology- Tattoo, port wine treatment.

Unit V

Orthotics & Prosthetic devices, overview of various orthotics & prosthetic devices along with its materials. Wheelchair Types, Materials used in wheelchair.

Text and Reference Books:

- [1] Medicine and Clinical Engineering By Jacobsons & Webster, PHI
- [2] Introduction to Biomedical Equipment Technology By Carr & Brown
- [3] Biomedical Instrumentation and Measurements By Cromwell, PHI
- [4] Handbook of Biomedical Instrumentation By R. S. Khandpur, TMH
- [5] The Biomedical Engineering Handbook, Bronzino, IEEE Press
- [6] Applied Chemical Engineering Feenberg,
- [7] Principles of Medical Imaging.-By: K. Kirk Shung, Michael B. Smith, Benjamin Tsui.-Pub: Academic Press.
- [8] Medical Laser Applications -By Carruth
- [9] Medical Lasers & their safe Use By Sliney & Trokal

Course Outcomes:

After the completion of course student will be able to:

- Well understanding of the concept of advanced biomedical instruments used in different industries.
- Knowledge development of Interaction of Lasers with Tissues will provide a base for research in field of cancer fighting equipment's.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP2C3: Modern Control Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Course Objective: The objective is to give students a clear understanding on characteristics of digital control systems from both frequency and time domain viewpoints. Also to give students the basic knowledge of nonlinear, optimal and adaptive control systems.

Prerequisite: Knowledge of classical control methods, Z-transform, mapping of s-plane to z-plane, & MATLAB control system toolbox

COURSE CONTENTS

Unit I

Data conversion & quantization, Sampling process, mathematical analysis of sampling process, Reconstruction of sampled signal, zero order, first order hold pulse transfer function, Block diagram reduction for systems interconnected through samplers, Sampled Signal flow graphs, Stability definition, Jury's test of stability, extension of Routh-Hurwitz criterion to discrete time systems, steady state error analysis.

Unit II

Root Loci, Frequency domain analysis, Bode plots, Nyquist plots, Gain margin & phase margin, Digital implementation of analog controllers: Digital controller Design: Classical methods, digital PID's, digital lead- lags, dead-beat controller.

Unit III

State space representation of discrete time systems, Solution of state equation, Pulse transfer function from state equation, Response between sampling instant using state model, observability, controllability, useful transformation in state space, pole placement methods, controller implementations, State observers.

Unit IV

Non Linear Control Design: Introduction, General properties of linear and nonlinear systems, describing function analysis: Definition, limitations, use of describing function for stability analysis, describing function of ideal relay, relay with hysteresis, dead zone, saturation, coulomb friction and backlash, Phase Plane Analysis, phase portrait of second order nonlinear systems, limit cycle, Equilibrium finding, Stability of Nonlinear Systems: Liapunov Theorems, An Overview of Kalman Filter Theory.

Unit V

Adaptive control: Model reference control. Identification, convergence and stability. Adaptive control of linear systems via state feedback and via output feedback. Adaptive control of nonlinear systems.

Optimal Control Design : Quadratic Optimal Control and Quadratic performance index, Optimal state regulator through the matrix riccati equations, Steady State Quadratic Optimal Control, Calculus of Variations: An Overview, Optimal Control formulation using Calculus of Variations, Classical Numerical Methods for Optimal Control, Linear Quadratic Regulator (LQR) Design – I, Linear Quadratic Regulator (LQR) Design – II

Text and Reference Books:

- [1] Kuo, Digital Control System, 2/e Oxford Press, 1992.
- [2] Ogata, Discrete – Time Control System, 2/e PHI, 1995.
- [3] M Gopal, Digital Control System, TMH, 1997.
- [4] H. K. Khalil, Nonlinear Systems, 3/e, Prentice Hall, 2002.
- [5] Jasbir Arrora, Introduction to Optimum Design, third edition, Elsevier. 2003

- [6] N Andreasson , A Evgrafov , M Patriksson , An Introduction to Continuous Optimization, Overseas Press, India Pvt. Ltd. 2006
- [7] D. S. Naidu, Optimal Control System, CRC Press, 2003
- [8] Arturo Locatelli, Optimal control: An introduction ,Birkhauser Verlag, 2001.
- [9] K.S. Narendra and A.M. Annaswamy, Stable Adaptive Systems, Prentice-Hall, 1989.
- [10] P. A. Ioannou and J. Sun, Robust Adaptive Control, Prentice-Hall, 1995 (available now at http://www.rcf.usc.edu/~ioannou/RobustAdaptiveBook95pdf/Robust_Adaptive_Control.pdf)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP2E1:Fuzzy Logic and Neural Network	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENT

Unit I

Introduction to Neural Networks: Mathematical models of a Neuron, Network Architectures, Perceptron and MLP, Back-Propagation Algorithm, Characterizing Neural Network Architectures, Learning in Artificial Neural Networks; Supervised, Unsupervised and Competitive Learning paradigms; Learning rules and Functions, Hebbian Learning, Associative Memories, Self Organizing Maps, Computing with Artificial Neural Networks, Applications of Artificial Neural Networks, RBF and RCE neural networks LVQ, Solving optimization problems using neural networks. Stochastic neural networks, Boltzmann machine

Unit II

Fuzzy sets, fuzzy logic and fuzzy inference, Rough sets.

Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions. Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations. Propositional logic and Predicate logic, fuzzy If – Then rules, fuzzy mapping rules and fuzzy implication functions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic

Unit III

Fuzzy neural networks Integration of fuzzy logic and neural networks, Fuzzy Hybrid neural, Computation of fuzzy logic inferences by hybrid neural net, Tuning fuzzy control parameters by neural nets, Fuzzy rule extraction from numerical data, Neuro-fuzzy classifiers, ANFIS, Applications of fuzzy neural systems, MATLAB based problems

Unit IV

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional method

Unit V

Fuzzy controllers, Fuzzification and Defuzzification Methods , Fuzzy Inference Techniques, Computer vision, applications of fuzzy logic in pattern recognition and image processing. Applications of Neural networks in pattern recognition problems

Text Books and References

- [1] G J Klir and B Yuan, "Fuzzy Sets and Fuzzy Logic - Theory and Applications", Prentice-Hall, 1995.
- [2] Neural Networks, Fuzzy logic and Genetic Algorithms, Synthesis and applications by S. Rajsekharan,
- [3] Vijayalaxmi Pai
- [4] C. Bishop, "Neural Networks for Pattern Recognition", Oxford University Press, 1995.

[5] D. Driankov, H. Hellendoorn and M Reinfrank, "An introduction to fuzzy control", Springer-Verlag, 1993

[6] S. Haykin, "Neural Networks: A Comprehensive Foundation", Prentice Hall, 1999

Course Outcomes:

After the completion of course student will be able to:

- Pattern identification and image pattern learning skills development.
- Speech and language processing can be more optimized after learning this course.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP2E2:ObjectOriented Programming	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: The aim of the course is to give a thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking.

Prerequisite(s): Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C.

COURSE CONTENTS

Unit I

Introduction: The History of Java, Java’s Key Features, The Java Virtual Machine, The First Application. Basic Syntax - Identifiers, Comments, Keywords, The Eight Primitives, Using Objects. Expression and Arrays : Using Operators, The ‘If-Else’ Statements, Using ‘While’ Loop, Selecting with ‘Switch’ statement, Dealing with Primitive Casts. Using Arrays - Creating an Array, Array Initialization, Working with Arrays, Using Multi- dimensional Arrays. Classpath&JARs: The ‘Classpath’ in Java, Java Archives.

Unit II

Classes: Classes & Packages, The ‘import’ Statement, The Importance of Encapsulation, Java Constructors, Access Modifiers (private, default and public), Method Overloading. Polymorphism and Inheritance: The ‘Protected’ Modifier, Using ‘this’ and ‘super’, The ‘final’ keyword, Static Members & Methods. Interfaces & Abstract Classes, The Complete Construction Process, The Class ‘Object’, Nested Classes, Enums in Java.

Unit III

Basic Design Patterns:

Basic Concepts of Design Patterns, Iterators, The Pattern Concept, The OBSERVER Pattern, Layout Managers and the STRATEGY Pattern, components, Containers, and the COMPOSITE Pattern, Scroll Bars and the DECORATOR Pattern. The Java Object Model: The Java Type System, Type Inquiry, the Object Class, Shallow and Deep Copy, Serialization, Reflection

Unit IV

Exception, Collections and IO

Exceptions & Assertions: Types of Program Errors, The Exception Model, Checked and Unchecked Exceptions, Defining Custom Exceptions, Assertions. Working with Common Classes: java.lang.String, java.lang.System, java.util.Calendar. The Java Collection Framework & Generics: List Basics, Using Lists Wisely, Other Collection Classes. Java IO: Input Stream/Output Stream, JavaSerialization, Readers & Writers, Working with Files.

Unit V

Thread and Applet

Threads: The Java Thread Model, Thread Priorities, Synchronization, Messaging, Thread Class, Runnable Interface. Applet Architecture – Skeleton- Simple Applet Display Methods- HTML APPLET tag – Passing Parameters to the Applet- AudioClip and AppletStub Interface - Delegation Event Model – Event Classes. Networking: Overview, TCP/IP Sockets, Writing Your Own Web Server.

Text Books and References:

Herbert Schildt, "Java The Complete Reference", Eighth Edition, Tata McGraw-Hill Edition India, 2011.

Cay Horstmann, "Object Oriented Design & Patterns", John Wiley & Sons, 2004.

Bruce Eckel, "Thinking in Java", 4th edition, Pearson Education, 2006.

Ramesh Vasappanavara et al, "Object-oriented Programming Using C++ and Java", First Impression, Pearson, 2011.

Cay Horstmann, "Big Java 4e for Java 7 and 8", John Wiley & Sons, 2010.

Course Outcomes:

After the completion of course student will be able to:

Develop live projects which will help in their research work.

Various IOT based application are developed by students in order to make ease of doing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credit s			
DIP2E3: Nanodevices & Nanosensors		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Course Objectives: this course will focus on understanding of the basic structure principals of Nano-devices and sensors.

Prerequisite(s): Introduce the quantum mechanical concepts needed to understand the operation

COURSE CONTENTS

Unit I

Quantum Devices: Quantum Electronic devices – Electrons in mesoscopic structures – Short channel, MOS Transistor – split Gate Transistor – Electron wave transistor – Electron spin transistor – Quantum Dot array – Quantum computer- Bit and Qubit. Carbon Nanotube based logic gates, optical devices. . Connection with quantum dots, quantum wires, and quantum wells

Unit II

Tunneling Devices: Tunnelling element – Tunnel Effect and Tunneling Elements-Tunnelling Diode – Resonant Tunnelling Diode – Three -Terminal Resonate Tunnelling Devices- Technology of RTD-Digital circuits design based on RTDs - Basics Logic Circuits – Single Electron Transistor(SET) – Principle – Coulomb Blockade- Performance – Technology- Circuit Design- Logic and Memory Circuits – SET adder as an Example of a Distributed Circuit.

Unit III

Nanosensors I: Micro and nano-sensors, Fundamentals of sensors, biosensor, micro fluids, Packaging and characterization of sensors, Method of packaging at zero level, dye level and first level. Sensors for aerospace and defense: Accelerometer, Pressure Sensor, Night Vision System, Nano tweezers, nano-cutting tools, Integration of sensor with actuators and electronic circuitry,

Unit IV

Nanosensors II: Sensor for bio-medical applications: Cardiology, Neurology and as diagnostic tool, For other civil applications: metrology, bridges etc. Biosensors. Clinical Diagnostics, generation of biosensors, immobilization, characteristics, applications, conducting Polymer based sensor, DNA Biosensors, optical sensors. Biochips. Metal Insulator Semiconductor devices, molecular electronics, information storage, molecular switching, Schottky devices,

Unit V

NEMS: Inertial sensors – accelerometer – gyroscope - micromechanical pressure sensors – pizoresistive – capacitive - microrobotics – micro channel heat sinks – optical MEMS – visual display – precision optical platform – optical data switching – RF MEMS – MEMS variable capacitors – MEMS switches – Resonators.

Test Books and Reference Books:

- [1] K. Goser, P. Glosekotter and J. Dienstuhl, “Nanoelectronics and Nanosystems-From Transistors to Molecular Quantum Devices” , Springer, 2004.
- [2] HerveRigneault, Jean-Michel Lourtioz, Claude Delalande, Ariel Levenson, “Nanophotonics”, ISTE.
- [3] W.R.Fahrner, “Nanotechnology and Nanoelectronics – Materials, Devices and Measurement Techniques”
- [4] Springer, 2006 13

- [5] Sensors: Micro & Nanosensors, Sensor Market trends (Part 1&2) by H. Meixner.
[6] Nanoscience & Technology: Novel structure and phenomena by Ping Sheng (Editor)
[7] Nano Engineering in Science & Technology : An introduction to the world of nano design by Michael Rieth.

Course Outcomes:

After the completion of course student will be able to:

Learning of Quantum Devices will provide a base for research work.

Various IOT based application are developed by students using the concepts of various sensors.

Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DIP2E4: Advance Digital Signal Processing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s): A basic course in Digital signal processing.

COURSE CONTENTS

Unit I

Overview of DSP, FIR filters, IIR filters, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, Linear prediction & optimum linear filters stationary random process, forward- backward filters linear prediction, solution of normal equation.

Unit II

Multi rate DSP, Sampling rate conversion, poly phase filters, multistage decimator & interpolator, QMF, digital filter banks, DFT in spectral estimation, Adaptive filters & spectral estimation.

Unit III

Minimum mean square criterion, , LMS algorithm, Recursive least square algorithm, Application of DSP& Multi rate DSP Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications.

Unit IV

Image representation: Gray scale and color images , image sampling and quantization. Image enhancement: Filter in spatial and frequency domains , histogram based processing and homomorphic filtering. Edge Detection edge linking, boundary descriptors. Image Segmentation :Thresholding, region based segmentation Image Compression: lossy and lossless compression techniques.

Unit V

Entropy coding, lossy and lossless predictive coding, uniform and non uniform quantizers, transform based compression, JPEG, Image reconstruction from projections: Principles, mathematical basis of tomography. Projections, The Fourier Slice Theorem, Reconstruction Algorithms for Parallel Projections, Three dimensional projections. Computer visualization of 3D data :Rendering techniques: Surface based and volume based techniques. Direct Volume rendering: Ray casting, opacity function. Maximum Intensity Projection

Text and Reference Books:

- [1] Gonzalez and Woods :Digital Image Processing, Pearson Education 3rd Edition
- [2] A.K.Jain : Fundamentals of Digital image processing , PHI

Course Outcomes:

After the completion of course student will be able to:

- Various speech and language processing enhancement will be done and research will be more refined.
- Three dimension projection process can be optimized by learning three dimension projection and many more research can be performed using the same concept.

**M. E. Electronics (Spl in Digital Communication) (PART TIME)
Curriculum & Syllabus**

S. No.	Category	No. of Credits					
		SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI
1.	Course Compulsory	10	5	10	5		
2.	Generic Elective	4	-	4	-		
3.	Programme Elective	-	5	-	5		
4.	Skill development	-	2	-	2		
5.	Seminar/ Workshop	-	2	-	2		
6.	Dissertation Phase		-		-	12	12
Actual Credits per semester		14	14	14	14	12	12
Total actual Programme Credits per semester							80
7.	Virtual Credited Comprehensive Viva	2	2	2	2	4	4
Total Credits per semester		16	16	16	16	16	16
Total Programme Credits per semester							96

M. E. Electronics (Spl in Digital Communication) (PART TIME)

S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	DCP1C1	Modern Communication System	3-1-1	PC1
2.	DCP1C2	Embedded System using ARM Microcontroller	3-1-1	PC2
3.	DCP1Gx	Generic Elective I	3-1-0	GE1
4.	DCP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II			L-T-P	
1.	DCP2C3	Advance Computer Networking	3-1-1	PC3
2.	DCP2Ex	Elective I	3-1-1	PE1
3.	DCP2W1	Seminar/ Workshop/Research Tool	0-2-0	
4.	ASP2S1	Soft Skills -1	2-0-0	
5.	DCP2V2	Comprehensive Viva II	0-0-2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
		List of Generic Elective I	L-T-P	
1.	DCP1G1	Advance System Design	3-1-0	
2.	DCP1G2	Wireless Sensor Network	3-1-0	
3.	DCP1G3	Advance Digital Signal Processing	3-1-0	
4.	DCP1G4	Information Theory and Coding	3-1-0	
		List of Elective I	L-T-P	
1.	DCP2E1	Satellite Communication	3-1-1	
2.	DCP2E2	Object Oriented Programming	3-1-1	
3.	DCP2E3	Embedded RTOS	3-1-1	
4.	DCP2E4	Software Engineering	3-1-1	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP1C1 Modern Communication System	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems. To analyze and evaluate performance of a digital communication system.

Prerequisite(s): Basic knowledge of digital communication

COURSE CONTENTS

UNIT -I

Review of basic concepts of communication systems, Source encoding, Speech encoding techniques (Source encoders, SBC, LPC, Hybrid coders), their applications, Base-band modulation techniques their comparison and spectrum associated with their waveforms.

UNIT -II

Channel coding-Linear Block Codes, Convolution Codes, Turbo Codes their encoding and decoding, introduction to high level channel codes, interleaving and concatenated codes.

Digital modulation and demodulation - PSK, DPSK, QPSK, M-aryPSK, QAM, MSK and GMSK their generation, detection & performance analysis and comparison in presence of noise.

UNIT -III

Multi-carrier modulation and OFDM, Orthogonality, Block diagram of OFDM, Applications of OFDM, Issues in OFDM systems. Spread spectrum systems: Types, PN sequences, Characteristics of PN sequences, generation and detection of DSSS and FHSS, Spreading gain, Applications to communication systems, Multi-user detection.

UNIT -IV

Wireless channels and propagation path loss models – ISI, Types of fading, models for multi-path reception, propagation models for wireless networks, Fading mitigation techniques, Equalization principle and types (LTE, ZFE, MMSE and DFE).

UNIT -V

Diversity techniques (frequency, time, and space), Multi-antenna systems, Smart antennas, Beamforming and MIMO system, spatial multiplexing, Tradeoffs among Diversity, Beam-forming gain & spatial multiplexing, Introduction to Cognitive Radio and Cooperative communication.

BOOKS RECOMMENDED

1. Bernard Sklar, “*Digital Communication*”, Pearson Education, 2nd Edition, 2004.
2. J.G.Proakis, *Digital Communication*, McGraw Hill, 4th Edition, 2001.
3. Lathi B. P., *Modern Analog and Digital Communication Systems*, 3rd Edition, Oxford Univ. Press, 2010.
4. Haykins Simon, *Digital Communication*, 3rd Edition, Wiley Publication, 2005.
I.S. Misra, *Wireless Communications and Networks*, 2nd Edition, TMH, 2009

List of Generic Elective I

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP1G1	L	T	P	L	T	P	Total
Advance System Design	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objective: To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite: Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit 1:

Introduction to digital IC design – full Custom and semicustom design flow and comparison , Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit 2:

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design-Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit 3:

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit 4:

Subsystem design principles-pipelining-Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model- Technology scaling effect on interconnect and -Noise in interconnects.

Unit 5:

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

BOOKS RECOMMENDED:

- [1] John M Yarbrough, “Digital Logic Applications and Design”, Thomson learning
- [2] Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata McGraw Hill Edition
- [3] Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005.
- [4] Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer, Third edition, 1999.

[5] Course outcomes**AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO**

- Will have in-depth knowledge regarding designing of advance digital system.
 - Work with system design for timing and performance trade off.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCP1G2	L	T	P	L	T	P	Total
Wireless Sensor Networks	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objectives: To list various applications of wireless sensor networks, describe the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks, and propose, implement, and evaluate new ideas for solving wireless sensor network design issues.

Prerequisite(s): Computer Networks

COURSE CONTENTS

UNIT I

Introduction and Overview of Wireless Sensor Networks

Introduction, Brief Historical Survey of Sensor Networks, and Background of Sensor Network Technology, AhHoc Networks, Applications of Wireless Sensor Networks: Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology, Basic Sensor Network Architectural Elements, Home Control, Medical Applications, Basic Wireless Sensor Technology : Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Network Standards: IEEE 802.15.4, ZigBee, IEE 1451

UNIT II

Medium Access Control Protocols for Wireless Sensor Networks

Introduction, Background, Fundamentals of MAC Protocols, MAC Protocols for WSNs: Schedule - Based Protocols, Random Access - Based Protocols, Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange (B -MAC,Box - MAC, Bit -MAC,H-MAC, I-MAC, O-MAC, S-MAC. Ri-MAC, T-MAC, Q-MAC (Query MAC), Q-MAC (QoS MAC), X-MAC)

UNIT III

Routing Protocols for Wireless Sensor Networks

Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time -Varying Characteristics,Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low - Energy Adaptive Clustering Hierarchy,Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion,Geographical Routing,

UNIT IV

Transport Control Protocols and Middle wares for Wireless Sensor Networks

Traditional Transport Control Protocols: TCP (RFC 793), UDP (RFC 768), MobileIP, Introduction, WSN Middleware Principles, Middleware Architecture: Existing Middleware: MiLAN (Middleware Linking Applications and Networks), IrisNet (Internet-Scale Resource-Intensive Sensor Networks Services)

UNIT V

Operating Systems for Wireless Sensor Networks Introduction, Examples of Operating Systems: TinyOS, Mate, MagnetOS

Books Recommended:

- [1] Wireless Sensor Network by KazemSohraby, Daniel Minoli, TaiebZnati Pub: Wiley.
- [2] Wireless Sensor Networks Signal Processing and Communications by Ananthram Swami, Qing Zhao, Yao -Win Hong, Lang Tong Pub: John Wiley & Sons.
- [3] Ad Hoc Wireless Networks: Architectures And Protocols By Murthy Pub: Pearson Education
- [4] Wireless sensor networks Edited by C. S. Raghavendra Pub: Springer
- [5] Fundamentals of Sensor Network Programming: Applications and Technology By Sridhar S. Iyengar, Nandan Parameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D. Okoye, Wiley

Course outcomes

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

Learn about the practical solution of various applications of wireless sensor networks.

Apply the concepts, protocols, and differences underlying the design, implementation, and use of wireless sensor networks.

Apply and implement, to evaluate new ideas for solving wireless sensor network design issues.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name		Instructions Hours per Week		Credits				
DCP1G3 Advance Digital Signal Processing		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objective: To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications. **Prerequisite(s):** A basic course in Digital signal processing.

COURSE CONTENTS

Unit 1

Overview of DSP, FIR filters, IIR filters, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, Linear prediction & optimum linear filters stationary random process, forward- backward filters linear prediction, solution of normal equation.

Unit2

Multi rate DSP, Sampling rate conversion, poly phase filters, multistage decimator & interpolator, QMF, digital filter banks, DFT in spectral estimation., Adaptive filters & spectral estimation.

Unit 3

Minimum mean square criterion, , LMS algorithm, Recursive least square algorithm, Application of DSP & Multi rate DSP Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications

Unit 4

Image representation : Gray scale and color images , image sampling and quantization. Image enhancement: Filter in spatial and frequency domains , histogram based processing and homomorphic filtering. Edge Detection edge linking, boundary descriptors. Image Segmentation : Thresholding, region based segmentation Image Compression: lossy and lossless compression techniques.

Unit 5

Entropy coding, lossy and lossless predictive coding, uniform and non uniform quantizers, transform based compression, JPEG, Image reconstruction from projections: Principles, mathematical basis of tomography. Projections, The Fourier Slice Theorem, Reconstruction

Algorithms for Parallel Projections, Three dimensional projections. Computer visualization of 3D data :Rendering techniques: Surface based and volume based techniques. Direct Volume rendering: Ray casting, opacity function. Maximum Intensity Projection

BOOKS RECOMMENDED:

- [1] Gonzalez and Woods :Digital Image Processing, Pearson Education 3rd Edition
- [2] A.K.Jain : Fundamentals of Digital image processing , PHI
- [3] J.G. Proakis and D.G .Manolakis Digital signal processing: Principles, algorithm and applications, Macmillan publishing
- [4] IfeachorE.C., Jervis B.W. Digital signal processing, a Practical approach, 2nd ed. Pearson edu. 2003.
- [5] Salivahanan, Vallavaraj&Gnanpriya Digital signal processing:: Tata Mcgraw Hill
- [6] References:
- [7] S.W.Smith Digital signal processing: A practical guide for engineers and scientists, Elsevier
- [8] S.K.Mitra , Digital signal processing:: Tata Mcgraw Hill

Course outcomes

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Having knowledge of different DSP algorithms.
 - Learn the concept of speech, multimedia and other signal processing applications.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP1G4 Information Theory and Coding	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives: To understand encoding and decoding of digital data streams. To introduce methods for the generation of these codes and their decoding techniques. To have a detailed knowledge of compression and decompression techniques.

Pre-requisites: To have the basic knowledge of digital and analog communication systems, and channels.

COURSE CONTENTS

Unit I

Information theory

Concept of amount of information - units, Entropy -marginal, conditional and joint entropies -relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.

Unit II

channels

Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, Shannon theorem. Continuous channels – Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

Unit III

Source coding

Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes – Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.

Unit IV

Error detection and correction

Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes – Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.

Unit V

Convolutional codes

Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes - Viterby algorithm, Sequential decoding -Stack algorithm. Interleaving techniques – Block and convolutional interleaving, Error Control and Signal Space Coding

Books Recommended:

- [1] Simon Haykin, *Communication Systems*, John Wiley & Sons. Pvt. Ltd, 2009
[2] Taub& Schilling, *Principles of Communication Systems*, Tata McGraw-Hill, 2007
[3] Das, Mullick&Chatterjee, *Principles of Digital Communication* ,Wiley Eastern Ltd,2002
[4] Shu Lin & Daniel J. Costello, *Error Control Coding Fundamentals and Applications*, Jr., Prentice Hall, Inc,2004.
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AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Apply encoding and decoding of digital data streams..
 - Apply methods for the generation of these codes and their decoding techniques.
 - Having detailed knowledge of compression and decompression techniques.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP2C3	L	T	P	L	T	P	Total
Advance Computer Networking	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.

Prerequisite(s): Fundamentals of computer networking, concepts of programming and operating systems.

COURSE CONTENTS

UNIT-1

Network Models, OSI Model, TCP/IP Protocol Suite, Addressing, Data Rate Limits, Performance Parameters, Transmission Media, Switching, Data Link Layer, Error Detection and Correction techniques.

UNIT-2

Data Link Control- LLC, HDLC , Multiple Access, Random Access, Wired LANS- Standard Ethernet, Fast Ethernet , Gigabit Ethernet , Wireless LANS, Bluetooth, Connecting Devices.

UNIT-3

Network Layer- Logical Addressing, IPV4 Addresses, IPV6 Addresses, Transition From IPV4 to IPV6, Address Mapping, ARP protocol, ICMP, Unicast Routing Protocols, Multicast Routing Protocols, Routing in Autonomous System

UNIT-4

Transport Layer- Process-To-Process Delivery, User Datagram Protocol (UDP), TCP, SCTP, Congestion Control, Quality of Service, Techniques to Improve QoS

UNIT-5

Application Layer- Domain Name System, Electronic Mail, File Transfer Protocol, HTTP, WWW, Remote Login (TELNET, SSH), Simple Network Management Protocol (SNMP), Internet Security-Network Layer Security, Transport Layer Security and Application Layer Security, Firewalls

BOOKS RECOMMENDED

- [1] B. Forouzan, "TCP/IP Protocol Suite", McGraw Hill, 3/e, 2006
- [2] Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP Vol. II design, Implementation of Intranets:", PHI, 3rd Edition 2000
- [3] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
- [4] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- [5] B. Forouzan, "Data Communication and Networking" 4th Ed Tata McGraw Hills
- [6] **Course outcomes**

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Will work with network layer protocols,
 - Learn various routing algorithm,
 - understanding of QOS parameters,
 - Application of transport and application layer protocols,
 - Will use of cryptography in computer networking.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instruction s Hours per Week			Credit s			
DCP2E1	L	T	P	L	T	P	Total
Satellite Communication	3	1	2	3	1	1	5
Duration of Theory Paper: 6 Hours/week							

Course Objectives: The course provides fundamentals, link design, overview of practical consideration and applications of satellite communication.

Prerequisite(s): Fundamentals of communication systems.

COURSE CONTENTS

Unit I

SATELLITE ORBITS: Kepler's Laws, orbital mechanics and parameters, – Look Angle Determination, orbital perturbations-longitudinal and inclination changes, geo stationary and non-geo-stationary orbits, Orbital Effects in Communications system performance- Doppler shift, range variations, solar eclipse, sun transit outage, Launching Procedures - launch vehicles.

Unit II

SATELLITE SUB-SYSTEMS AND LINK DESIGN: Satellite sub systems, Attitude and Orbit control system, Telemetry, Tracking and command. Communication sub-systems- Description of the communication system and various types of transponders, satellite antennas.

Satellite link design-Basic transmission theory, system noise temperature and G/T ratio, design of downlinks, satellite system using small earth stations, uplink design, system design examples, Ku band uplink and downlink design and rain effects on Ku band.

Unit III

MODULATION AND MULTIPLEXING TECHNIQUES FOR SATELLITE LINKS: Frequency modulation, Analog FM transmission by satellite, digital transmission, digital modulation and demodulation digital transmission of analog signals, time division multiplexing- TDM terminology, TDM systems and channel synchronization in TDM.

Unit IV

MULTIPLE ACCESS TECHNIQUES USED IN SATELLITE COMMUNICATION: FDMA-intermodulation, calculation of C/N with intermodulation, TDMA-Bits, symbol and channels, frame structure, TDMA in a fixed station network- synchronization and transmitter power in TDMA networks, CDMA, spread spectrum transmission and reception, CDMA in a fixed earth station and LEO satellite network.

Unit V

SATELLITE APPLICATIONS: VSAT Systems-overview, network architecture, access control protocols, modulation and multiple access selection, VSAT earth station and calculation of link margin, Low earth orbit and Non Geo –stationary satellite systems-Orbit consideration, coverage and frequency consideration, delay and throughput considerations, system considerations, DBS system, Satellite navigation and the Global Positioning System .

BOOKS RECOMMENDED:

- [1] T. Pratt, C. Bostain, J. Allnutt, ‘Satellite Communications’, Second Edition, John Wiley & Sons, 2003.
- [2] M.Richharia, ‘Satellite Communication Systems-Design Principles’, Macmillan 2003
- [3] Bruce R. Elbert, ‘The Satellite Communication Applications’ Hand Book, Artech

Course outcomes:

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Will perform and understand the concept of link design
- Can apply the practical consideration and applications of satellite communication.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP2E2	L	T	P	L	T	P	Total
Object Oriented Programming	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: The aim of the course is to give a thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking. **Prerequisite(s):** Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C.

COURSE CONTENTS

UNIT -I Introduction to Object Oriented Programming and Java :

Object Oriented Concepts, Abstraction, Encapsulation, Information Hiding. Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods

UNIT -II

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

UNIT -III

Exception Handling, Multithreading and Introduction to Java APIs:

Exceptions: Need for exceptions, Checked V/s Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle. String Handling, Wrapper classes: Arrays and Vectors

UNIT -IV

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

UNIT -V

Introduction to elementary procedures, Real & Complex vector and Matrix & Determinants and operations like: Initialization, Duplication, Elimination, Interchanging, Rotation, Norms, Scaling, Multiplication & calculation of rank etc., Evaluation of various polynomials like Chebyshev polynomial, Fourier polynomial etc., Analysis of real matrix problems like: Overdetermined systems, underdetermined system, homogenous, pseudo inversion. Sparse Real matrices, Similarity Transformation, Eigen value problems., Numerical differentiation, Differential equations, Introduction to special functions like: Exponential, Gamma, Error, Infinite time series, Fast Fourier transforms etc

BOOKS RECOMMENDED:

- [1] Hang T. Lau, *A Numerical Library in Java for Scientist & Engineers*, Library of Congress Cataloging-in-Publication Data by Chapman & Hall/ CRC Press Company.
- Cay S. Horstmann, *Core JAVA Vol-1*, Pearson Education.
 - Herbert Schildt, *The complete Reference*, Tata McGraw Hill.
 - Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, Oreilly

Course Outcomes:

After the completion of course student will be able to

- Thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking.
-

Devi Ahilya University, Indore, India				ME – I Year (Spl Digital Communication) Semester- A			
Institute of Engineering & Technology							
Subject Code & Name	Instructio ns Hours per Week			Credits			
DCP2E3	L	T	P	L	T	P	Total
Embedded RTOS	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective: provide an understanding of general embedded system concept, Embedded Software development, RTOS essentials, advantages and trade-offs. It will provide practical experience necessary to use an RTOS in an embedded system development

Prerequisites : Operating system, Microcontrollers and C Programming

COURSE CONTENTS

UNIT – I:

Introduction

Introduction to UNIX/LINUX, Overview of Commands, File I/O (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II:

Real Time Operating Systems

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - III:

Objects, Services and I/O

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV:

Exceptions, Interrupts and Timers

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

Embedded Firmware:

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - V:**Case Studies of RTOS**

RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

Books Recommended:

- [1] Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011
- [2] Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
- [3] Advanced UNIX Programming, Richard Stevens
- [4] Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaug

Course Outcomes:**After the completion of course student will be able to**

- Solve the problem regarding the embedded system concept
- Solve the problems related to Embedded Software development,
- Will have practical knowledge about RTOS essentials, also learn advantages and trade-offs. It will provide practical experience necessary to use an RTOS in an embedded system development
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP2S1: Soft Skill-1	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	-	-	2	-	-	2

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory
Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

3. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
4. Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
5. Kumar Mahi. Stress Coping Skills Ebook, [Health & Medicine, Technology](#), 2009.
6. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
7. Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

M.E Mechanical Engineering (Industrial Engineering & Management)

(Part Time)

Proposed Scheme for CBCS

SEM I	Sub Code	Sub Name	Number of Credit	Sub Type
S.NO				
1.	IMP1C1	Productivity & Technology Management	3-1-1 =5	PC1
2.	IMP1C2	Quantitative Techniques for Management	3-1-1 =5	PC2
3.	IMP1Gx	Generic Elective I	3-1-0 =4	GE1
4.	IMP1V1	Comprehensive Viva I	0-0-2=2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
1.	IMP2C3	Production & Operations Management	3-1-1 =5	PC3
2.	IMP2Ex	Elective I	3-1-1 =5	PE1
3.	IMP2W1	Seminar/ Res. Tool/Work Shop-1	0-2-0 =2	
4.	IMP2V2	Comprehensive Viva II	0-0-2 =2	
5.	ASP2S1	Soft Skills -1	2-0-0 =2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
		List of Generic Elective I		
1.	IMP1G1	Principles & Practices of Management		
2.	IMP1G2	Human Resource management		
3.	IMP1G3	e –Business & Commerce)		
1.	IMP2E1	List of Elective I		
		Statistical Quality Control and Total Quality		
1	IMP2E1	Management		
2.	IMP2E2	Strategic Management		
3.	IMP2E3	Business Process Reengineering		

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMPIC1 PRODUCTIVITY AND TECHNOLOGY MANAGEMENT.	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites: To impart the basics of Productivity Concepts, to refine the skills of Workplace design through Work Study, Job Evaluation, etc. To develop the skills of Technology management through different technology transfer.

COURSE CONTENTS

UNIT-1

Productivity:

Productivity, Introduction, types of productivity, methods to improve productivity. Introduction to work study, method study, definition, importance, selection, recording, different recording techniques, principal of motion economy.

UNIT-2

Work Measurement:

Introduction to work measurement, time study, Steps in time study. Various techniques to measure time, slandered time, normal time, observed time. Allowances, measurement & significance. Work sampling, introduction & importance

UNIT-3

Job Evaluation:

Job evaluation and merit rating, introduction to job evaluation, various method of job evaluation, importance of job evaluation.

UNIT-4

Technology Management: Introduction to technology, technology management, importance of technology management, know how of technology, know why of technology, dimensions of technology management Technology life cycle, syndication diffusion.

UNIT-5

Technology Transfer

Technology forecasting, introduction, importance, absorption & adoption, generation of technology, method of technology transfer, technology transfer modes, technology diffusion, importance. Technology requirement for India, strategies for the companies in the changing environment. Case studies.

BOOKS RECOMMENDED:

- [1]. Dhawan, *Productivity and Technology Management*. 2002
- [2]. I.L.O, *Work Study*. 2004
- [3]. Branes K.M, *Time & Motion Study*.
- [4]. Farland Mc, *Management –Principal and Practice*. .Dec 1990
- [5]. Dr. Sushil, *Technology Management*. New Delhi Vikas, 2001

LABORATORY EXPERIMENTS:

1. Study and analysis of Different productivity Measures related to specific industries.
2. Study and analysis of different Recoding techniques for a given process.
3. Estimation of Standard Time for a given Job, Process and its comparison with relevant industry data.
4. Study and Analysis of Job Evaluation process and its comparison with related industry.
5. Study of Technology Transfer process with special cases of industries or service organisation.
6. Study of Technology Forecasting methods and their applications in Indian context.
7. Case studies.

Course outcomes

After completing the course the student will able to

:

- Can perform analysis of Different productivity Measures related to specific industries.
- Having the practical approach towards analysis of different Recoding techniques for a given process.
- Can make Estimation of Standard Time for a given Job, Process and its comparison with relevant industry data.
- Go in to deep and can make analysis of Job Evaluation process and its comparison with related industry.
- Having knowledge of technology transfer process with special cases of industries or service organization.
- Learn about various Forecasting methods and their applications in Indian context.
- Case studies.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time				
Subject Code & Name		Instructions Hours per Week		Credits				
IMP1C2		L	T	P	L	T	P	Total
QUANTITATIVE TECHNIQUES FOR MANAGEMENT		3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites: To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming, Transportation, Assignment, Queuing etc. Strategies formulation with the help of game theory and simulation etc.

COURSE CONTENTS

UNIT-1

Introduction:

History and development of O.R Present Trend.

Linear Programming:

Formulation, graphical methods, simplex method, Big- M- method, two phase method, degeneracy unrestricted variables. Quality in L p. revised simplex, duality, sensitivity analysis.

UNIT-2

I Assignment Models: Formulation, Balanced and Unbalanced problems.

II Transportation: Formulation, graphical methods

III Introduction to Integer Programming.

UNIT-3

Waiting Line Models:

Introduction, classification, state in queue, probability distribution of arrival and service times. Single server model (M/M/I). Multiple server model (MMS). Birth & death process.

UNIT-4

Game Theory & Simulation:

Rectangular, two persons, zero sum games, maximin and minimax Principles. Saddle point. Dominic. graphical and algebraic method of solution by transforming into linear programming problem. Bidding problem. Building a simulation model, Monte-Carlo simulation and application.

UNIT-5

Dynamic Programming: Introduction, developing optimal decision policy.

Replacement and Maintenance Models: Introduction, Individual replacement and group replacement policy.

BOOKS RECOMMENDED:

- [1]. Taha, *Operations Research*, Tata Mc.Graw Hill.
- [2]. Wagner, *Operations Research*, PHI. New Delhi, 2003
- [3]. Ravindram & Philips, *Operations Research*, Tata Mc.Graw Hill.
- [4]. Gupta & Hira, *Operations Research*, S. Chand. 1e, 2008
- [5]. Chittle & Negi, *Operations Research*, Jain Brothers.
- [6]. Vohra N.D, Kataria S.K, *Quantitative Techniques for Management*. Tata Mc.Graw Hill, 2004.

LABORATORY EXPERIMENTS:

1. Development, Formulation and Analysis of Linear Programming Problem for given decision making situations.
2. Development and Analysis of Transportation and Assignment models.
3. Development, Formulation and Analysis of Inventory problem for a given system.
4. Study and modeling of Queuing situations at a given service problems.
5. Simulations exercise relating various operations research problems.
6. Development & solution of dynamic programming models.
7. Formulation and solution of various replacement models.
8. Case studies based on Operations Research Problems.

Course outcomes

After completing the course the student will able to

- Having knowledge of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming, Transportation, Assignment, Queuing etc. Strategies formulation with the help of game theory and simulation etc.
- Learn the process of development formulation and analysis of Linear Programming Problem for given decision making situations.
- Development and Analysis of Transportation and Assignment models.

- Learn the Development, Formulation and Analysis of Inventory problem for a given system.
- Able to model Queuing situations at a given service problems.
- Perform various Simulations exercise relating various operations research problems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP1G1	L	T	P	L	T	P	Total
PRINCIPLES & PRACTICES OF MANAGEMENT	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Management Functions.

COURSE CONTENTS

UNIT-1

The Nature of Management:

Definition and role of management, the function of a manager, scientific management. Various schools of management thought.

UNIT-2

Planning: Nature and purpose of planning, components of planning objective of business, forecasting, decision making, policy formulation and strategies. Management by objectives.

UNIT-3

Organization:

Nature and purpose of organizing structure, centralization, decentralization, span of control, delegation of authority relationship. Shaping the overall structure, formal and informal organization.

UNIT-4

Directions & Staffing:

Direction process, theories of motivation and leadership, need analysis, communication. Role and function of personal management, manpower planning, selection and recruitment, interviewing, training methods, welfare techniques.

UNIT-5

Control:

Meaning and process of control techniques of control evaluation, developing and compensating the employees, merit rating. Comparison of American, Japanese and Indian philosophies of management.

BOOKS RECOMMENDED:

- [1].Koontz and O'Donnell, *Essentials of Management* .Mc.Graw-Hill, Jan 1986.
- [2].Terry G.R, *Principals of Management*.
- [3].Peter Drucker, *Practice of Management*. 1992.
- [4].Farland Mc, *Management, Principal and Practice*.
- [5].Prasad L.M, *Principal and Practice & Mgt*.Sulatan Chand & Sons.
- [6].Chhabra T.N, *Principal and Practice & Mgt*.
- [7].Agrawal R.D, *Organization & Management*. McGraw-Hill New Delhi, 1997.

Course outcomes**After completing the course the student will able to:**

- Learn various Scientific management process
- Learn various schools of management thought.
- Get a deep knowledge of training methods, manpower planning, selection and recruitment, interviewing, welfare techniques.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time				
Subject Code & Name		Instructions Hours per Week			Credits			
IMP2E1 STATISTICAL QUALITY CONTROL AND TQM		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	1	3	1	1	5

Objective and Pre requisites: To develop the skills required for Quality onsciousness among the students. Basics of Quality control through different techniques like theory of Control charts & Acceptance sampling. To build the Knowledge base of Total Quality Management, Six Sigma etc.

COURSE CONTENTS

UNIT-1

Quality Control:

Definitions, place of quality control in industries, quality control organization, difference between inspection and quality control, application of quality control in industries, economic of quality systems, quality assurance. Theory of Control Charts Sample size and frequency of sampling, out control, control for variables and attributes and their application design of X and R charts, Process capability studies.

UNIT-2

Acceptance Sampling:

Single sampling planes, double sampling& sequential sampling planes, rectifying inspection for lots, sampling planes for continues production, selection of sampling planes for different situation, economics of acceptance sampling.

UNIT-3

Total Quality Management (TQM):

Evolution of total quality management , historical perspective, elements of TQM - Total employee involvement , elimination of waste and problem exposure , total quality control systems , Deming's wheel , Deming's 14 points – pros and cons in industrial engineering context , Philip Crosby philosophy , Juran philosophy , Ishikwa diagram , Just – in- Tinme philosophy design and development strategy in TQM – Quality function deployment.

Application of TQM to service type organization, service guarantees, case studies on application of TQM to services type organization, various quality award, cost benefit analysis, life cycle costing.

UNIT-4

Reliability:

Distributions encountered in controlling reliability mean time to failure , exponential failure density, MTTF, Weibull, failure density, measurement and tests , maintenance and reliability , life testing.

UNIT-5

Concepts & Application of 6 – Sigma Quality:

Comparison between 3-sigma & 6- sigma quality relationship between DPMO and slandered normal variate , short term and long term yield cost and quality effectiveness of 6- sigma strategy , DMAIC approach to 6-sigma implementation application to service industry link between 6- sigma & DOE. ISO 9000 Series and SPC, Quality Circles

BOOKS RECOMMENDED:

- [1]. Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons, 2001.
- [2]. Mitra A., *Quality Control Applications*, Pearson Education. 2e, 1998
- [3]. Sharma D. D, *Total Quality Management*, Sultan Chand & Sons. New Delhi, 2000
- [4]. Basterfield, *Total Quality Management*, Pearson Education, 2003
- [5]. Logothitis, *Total Quality Management*, PHI.

Course outcomes

After completing the course the student will able to:

- Able to perform analysis of set parameters relating to different mathematical distributions (Variable).
- Learn different mathematical distributions (Discrete) methods.
- Learn about Construction & analysis of various process control charts.
- Analyse the performance of Acceptance Sampling for a given set of lots.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMP1G2							
HUMAN RESOURCE MANAGEMENT	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: The objective of this course is to help the students develop an understanding of the dimensions of the management of human resources, with particular reference to HRM policies and practices at international level.

COURSE CONTENTS

UNIT-1

HRM Concept

Definition, Concept, Evaluation and Relevance of HRM. Human Resource functions, HRM in Indian and Global Scenario. Human Resource Policies.

UNIT-2

Human Resource Acquisition Process

Job Analysis - Job Specification, Job Analysis Methods, Human Resource Planning Concept and Process of HRD, HRP Process at National and Corporate Level, Human Resource Information System. Steps of HRIS, Recruitment, Sources of recruitment, Selection, Stages in selection process. Global Scenario in HR Acquisition

UNIT-3

Human Resource Training and Development.

Orientation, Training and Development Process and Methods, Need Assessment, Training Evaluation, Approaches and Types of Evaluation Instruments, Developing Effective Training Programmes, HRD mechanism, HRD for Organizational Effectiveness

UNIT-4

Appraising and Improving Performance

Basic Concepts Objectives and Process of Performance Appraisal Systems, Performance versus Potential Appraisal, Types of Employee Appraisal Systems, New Trends in Performance Appraisal Systems at Global level, Succession Planning, Career Planning and Assessment Centers.

UNIT-5

Maintenance of Human Resources:

Job Evaluation, Incentive and Reward System, Objectives and Major Phases of Compensation Management, Cross-national variation in reward structures. Knowledge & knowledge transfer, knowledge and situation cognition, Implications for knowledge transfer, knowledge management in multinational companies, knowledge management & International HRM.

BOOKS RECOMMENDED:

- [1] Bohlander, Human Resource Management, 14 th edition Cengage Learning, India, 2009
- [2] Dessler, Verckey, Human Resource Management, Pearson Education, 2009.
- [3] Monir H. Tayeb, International Human Resource Management, Oxford, 2009.
- [4] Patnaik, Human Resource Management, 3 rd edition, PHI, 2009.
- [5] Subba Rao, Essential of HRM and Industrial Relation, Himalaya Pub. House. 2008,
- [6] Subba Rao, International Human Resource Management, Himalaya Publishing House., 2009.
- [7].Jeffery Mello, Human Resource Management, Cengage Learning, India, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP1G3	L	T	P	L	T	P	Total
E- BUSINESS & COMMERCE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

UNIT – 1

Introduction

Fundamentals in E-Commence – Meaning, Nature, Limitation, E – Commerce – Origin, Nature, Meaning, Definitions, Features, Need , Advantages & Disadvantages, Essential requirements, e – Commerce Vs Traditional Commerce.

UNIT – 2

Business Models for e Commerce

e-Business: Meaning, Definition, Importance, e Business models based on the Relationships of transaction parties, B2C, B2B, C2C, C2B. e Business models based on the relationship of transaction types – Manufacture Model, Advertising Model, Value Chain Model, Brokerage Model.

UNIT – 3

E –Payment Systems:

Modes of e Payment – Credit Cards, Debit Cards, Smart Cards, e Credit Accounts, e Money/Cash, Digital Signatures – Legal Positions of Digital Signatures, How Digital Signature Technology Works, Risks & e Payment system : Data protection, risk from mistakes & disputes – Consumer protection, Management Information Privacy, Managing Credit Risk.

UNIT – 4

E-Business Communication

Introduction, Importance of e Technology in e Business Communication, Modes of e-Business communication, e- Business Communication, e – Business Conferencing – Audio, Document Telephone, Video Conferencing – Types Email in e Commence, Mobile Communication. E – Banking Introduction concept & meaning, Electronic Fund Transfer – Automated Clearing house, Automated ledger posting, Electronic Money transfer e- Cheque, ATM, FOS, Tele banking.

UNIT – 5

E- Security & E- Markets

Introduction, Need for Security, Security concepts, attacking methods – Cyber crimes, Cryptology, Hacker, encryption. E-commerce security solutions – E – Locking Techniques, e-Locking product, e-Locking services, Net Scape security solution E-Markets: On line shopping – On Line purchasing –Electronic Market –Three models of e-Markets, e-Advertising e- Branding.

BOOKS RECOMMENDED:

1. Murthy C.S.V., e Commerce–Concepts Models Strategies Himalaya Publishing House 3e, 2005.
2. Basics of e Commerce-Legal & Security issues ISBN 81-203-2432-3.
3. Joseph P.T., e Commerce : An Indian Perspective, 2ndEd., SJ, 2006.

Course outcomes

After completing the course the student will able to:

- Learn about e – Commerce Vs Traditional Commerce
- Learn about Manufacture Model, Advertising Model, Value Chain Model, and Brokerage Model.
- Learn the practical implementation of Advertising Model, Value Chain Model, and Brokerage Model.
- Learn the features and practical implementation of e- Business Communication, e – Business Conferencing – Audio, Document Telephone,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMP2E3 BUSINESS PROCESS RE-ENGINEERING	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: To provide a greater understanding of effective solutions to change problems that need to combine technological, organizational and people-orientated strategies by adopting a process based approach to change management. To introduce the contingencies that affect management and the most effective measures for dealing with them. To introduce strategic IS/IT planning and how it must relate to business strategy. To demonstrate the use and validity of organizational development models through current real-life case studies.

COURSE CONTENTS

UNIT-1

Business process reengineering-an overview:

Historical background Fundamentals of BPR Concepts and techniques. Changing business processes: the importance of technology as a driver for organization: Nature, significance and rationale of business process reengineering (BPR),

UNIT-2

Process redesign:

Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, measuring existing processes, Role of information technology (IT) and identifying IT levers.

UNIT-3

Designing and building a prototype of the new process:

BPR phases, Relationship between BPR phases. BPRE & TQM, benchmarking, ISO standards. Implementation of BPRE-business process management, principles, Business models, barriers.

UNIT-4

Change management:

Change and the manager: change and the human resource: the cultural web and the past: the cultural attributes of change Typical BPR activities within phases: Change management, Performance management, and programme management.

UNIT-5

BPR and continuous improvement:

Co-ordination and complementary efforts, IT capabilities and their organizational impacts, Implementation of BPR, Stages of implementation and critical aspects, Case studies on BPR. The concept of the learning organization and its influence on systems development: restructuring the organization .The importance of communication and the resistance to change: building the culture for successful strategy implementation; the influence IT will have on the internal appearance of organizations in the future.

BOOKS RECOMMENDED:

- 1.Omar El Sawy, Business Process Re-engineering, Tata McGraw Hill , 2010
- 2.R. Srinivasan, Business Process Re-engineering, Tata McGraw Hill , 2011
- 3.Warner Winslow, Strategic Business Process Transformation through BPR, , Tata McGraw Hill , 1996
4. R. Radhakrisnan, Business Process Reengineering, Prentice Hall of India.

Course outcomes

After completing the course the student will able to:

- Learn about Historical background Fundamentals of BPR Concepts and techniques.
- Able to make analysis of Major issues in process redesign:.
- Adopt the features of information technology (IT) and identifying IT levers.
- Designing and building a prototype of the new process.
- Change management, Performance management, and programmed management.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time				
Subject Code & Name		Instructions Hours per Week			Credits			
IMP2E2		L	T	P	L	T	P	Total
STRATEGIC MANAGEMENT		3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours								

Objectives & Prerequisites:

The objective of teaching this course is to enable students to integrate knowledge of various functional areas and other aspects of management, required for perceiving opportunities and threats for an organization in the long-run and second generation planning and implementation of suitable contingency strategies for seizing / facing these opportunities & threats.

COURSE CONTENTS

UNIT-1

Introduction:

Meaning, Need and Process of Strategic Management; Business Policy, Corporate Planning and Strategic Management; Single and Multiple SBU organisations; Strategic Decision-Making Processes – Rational-Analytical, Intuitive-Emotional, Political – Behavioral;

UNIT-2

Objectives & Strategic Analysis:

Need, Formulation and changes in these three; Hierarchy of objectives, Specificity of Mission and Objectives. SWOT Analysis General, Industry and International Environmental Factors; Analysis of Environment, Environmental Threat and Opportunity Profile (ETOP) Strategic Advantage Profile (SAP).

UNIT-3

Strategy Alternatives:

Grand Strategies and their sub strategies; Stability, Expansion, Retrenchment and Combination; Internal and External Alternatives; Related and Unrelated Alternatives, Horizontal and Vertical Alternatives; Active and Passive Alternatives; International Strategy Variations

UNIT-4 Strategy Choice: Making: Managerial Choice Factors, Choice Processes – Strategic Gap Analysis, ETOP-SAP Matching, BCG Product – Portfolio Matrix, G.E. Nine Cell Planning Grid; Prescriptions for choice of Business Strategy

UNIT-5

Strategy Implementation, Evaluations and Control:

Strategy Implementation, Evaluations and Control: Implementation Process; Resource Allocation; Organizational Implementation; Plan and Policy Implementation; Control and Evaluation Process; Criteria for Evaluation; Measuring Feedback; and Corrective Action.

BOOKS RECOMMENDED

1. Azhar Kazmi, Business Policy and Strategic Management, TMH, 2010
2. Fred David, Strategic Management Concepts and Cases, PHI, 12 Ed
3. Whller and Hunger, Basic Concepts of Strategic Management, TMH, 12 Ed

Course outcomes

After completing the course the student will able to:

- Learn about various Processes – Rational–Analytical, Intuitive-Emotional,
- Perform SWOT analysis.
- Know about the fact used for the practical implementation of Strategy alternatives.
- Learn Managerial Choice Factors, Choice Processes – Strategic Gap Analysis.
- How to make Strategy Implementation, Evaluations and Control.
- Learn the procedure related to Implementation; Control and Evaluation Process.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP2E1 STATISTICAL QUALITY CONTROL AND TQM	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Objective and Pre requisites:

- To develop the skills required for Quality consciousness among the students. Basics of Quality control through different techniques like theory of Control charts & Acceptance sampling. To build the Knowledge base of Total Quality Management, Six Sigma etc.

COURSE CONTENTS

UNIT-1

Quality Control:

Definitions, place of quality control in industries, quality control organization, difference between inspection and quality control, application of quality control in industries, economic of quality systems, quality assurance. Theory of Control Charts
Sample size and frequency of sampling, out control, control for variables and attributes and their application design of X and R charts, Process capability studies.

UNIT-2

Acceptance Sampling:

Single sampling planes, double sampling& sequential sampling planes, rectifying inspection for lots, sampling planes for continues production, selection of sampling planes for different situation, economics of acceptance sampling.

UNIT-3

Total Quality Management (TQM):

Evolution of total quality management , historical perspective, elements of TQM - Total employee involvement , elimination of waste and problem exposure , total quality control systems , Deming’s wheel , Deming’s 14 points – pros and cons in industrial engineering context , Philip Crosby philosophy , Juran philosophy , Ishikwa diagram , Just – in- Tinme philosophy design and development strategy in TQM – Quality function deployment.

Application of TQM to service type organization, service guarantees, case studies on application of TQM to services type organization, various quality award, cost benefit analysis, life cycle costing.

UNIT-4

Reliability:

Distributions encountered in controlling reliability mean time to failure , exponential failure density, MTTF, Weibull, failure density, measurement and tests , maintenance and reliability , life testing.

UNIT-5

Concepts & Application of 6 – Sigma Quality:

Comparison between 3-sigma & 6- sigma quality relationship between DPMO and slandered normal variate , short term and long term yield cost and quality effectiveness of 6- sigma strategy , DMAIC approach to 6-sigma implementation application to service industry link between 6- sigma & DOE. ISO 9000 Series and SPC, Quality Circles

BOOKS RECOMMENDED:

1. Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons, 2001.
2. Mitra A., *Quality Control Applications*, Pearson Education. 2e, 1998
3. Sharma D. D, *Total Quality Management*, Sultan Chand & Sons. New Delhi, 2000
4. Basterfield, *Total Quality Management*, Pearson Education, 2003
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Course outcomes

After completing the course the student will able to:

- Able to perform analysis of set parameters relating to different mathematical distributions (Variable).
- Learn different mathematical distributions (Discrete) methods.
- Learn about Construction & analysis of various process control charts.
- Analyse the performance of Acceptance Sampling for a given set of lots.

M.E Mechanical Engineering (Design & Thermal) (Part Time)
Proposed Scheme for CBCS

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit	SubType
1.	DTP1C1	Tribology	3-1-1 =5	PC1
2.	DTP1C2	Design of Internal Combustion Engine Systems	3-1-1 =5	PC2
3.	DTP1GX	Generic Elective I	3-1-0 =4	GE1
4.	DTP1V1	Comprehensive Viva I	0-0-2=2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
1.	DTP2C3	Advanced Machine Design	3-1-1 =5	PC3
2.	DTP2EX	Elective I	3-1-1 =5	PE1
3.	DTP2W1	Seminar/ Res. Tool/Work Shop-1	0-2-0=2	
4.	DTP2V2	Comprehensive Viva II	0-0-2=2	
5.	ASP2S1	Soft Skills -1	2-0-0 =2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I				
1.	DTP1G1	Advanced Thermodynamics		
2.	DTP1G2	Non Conventional Energy Systems		
3.	DTP1G3	Management Information System		
4.	DTP1G4	Finite Element Analysis		
List of Elective I				
1.	DTP2E1	Advanced Mechanics of Solids		
2.	DTP2E2	Fatigue Creep and Fracture		
3.	DTP2E3	Mechanism and Robot Kinematics		
4.	DTP2E4	Thermal Systems : Simulation and Design		

Devi Ahilya University, Indore, India Institute of Engineering & Technology			M.E.(Design & Thermal) Semester A Part Time				
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
<i>DTPICI</i>	L	T	P	L	T	P	Total
Tribology	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are material science and machine design.

UNIT- 1

Fundamentals of Tribology:

Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques.

UNIT- 2

Friction:

Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods.

UNIT- 3

Wear:

Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-4

Lubrication:

Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Grease and anti seizures, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring.

UNIT- 5

Design for Tribological Elements:

An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication, Design of hydrodynamically loaded journal bearing, externally pressurized bearing, rolling element bearing, performance analysis of bearing.

BOOKS RECOMMENDED

[1]. Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975

[2].Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005

LABORATORY EXPERIMENTS:

1. Performance analysis of Journal Bearings.
2. Experimental analysis of Lubricants.
3. Experimental analysis of Friction on different material.
4. Study of method for Wear Debris analysis.
5. Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO HAVE

The knowledge of the subject and fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are material science and machine design.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			M.E.(Design & Thermal) Part Time				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTP1C2							
Design of Internal Combustion Engine Systems	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives: To impart the knowledge of internal combustion engine from systems design perspective.

Pre requisites: Fundamentals of thermodynamics, Combustion process, Theory of Internal combustion Engines.

COURSE CONTENT

UNIT-1

Genesis

Evolution: Limitation of Steam Engines, Hot Air Engine, Internal Combustion Engines, Atmospheric Engines, Lenoir Engines, Otto-Langen Engine; Engine Cycles; Flow chart of typical Internal Combustion engine processes; Classification; Configurations; Operational and performance parameters; Fuels for engines: composition, characteristics.

UNIT-2

Induction and Exhaustion Systems

Gas exchange; Intake system: Air-filter, Carburetor, Injectors: throttle body, port, direct injection; Diesel Injection: Low and High pressure Common Rail Systems, Jerk pump systems, Electronically controlled; Manifolds; Superchargers and turbochargers; Exhaust Systems; Exhaust manifold, Exhaust Pipe, Catalytic Converter, Muffler; Valves Flows:Flow Patterns, Discharge Coefficient, Performance, Timing and its Effects; Scavenging: Performance parameters; Volumetric Efficiency.

UNIT-3

In-cylinder flows and Combustion Thermochemistry

In-cylinder flows: Measurement; Swirl: Induction Swirl, Swirl Coefficient, Swirl Ratio; Swish; Tumble; Squish; Prechamber flows;Stoichiometry Relations: Air required for Complete Combustion based on Fuels, Incomplete Combustion, Calculation of Dry Flue Gases for known fuel composition, Estimating Fuel Composition and Excess Air quantity from Exhaust Gas Analysis, Flue Gas Analysis (O₂, CO₂, CO, NO_x, SO_x); Combustion Terminology: Adiabatic Flame temperature, Combustion Rates, Equilibrium Coefficient, First Law applied to Chemical Reactions Combustion Efficiency.

UNIT-4

IC Engines Sub Systems

Starting and Charging systems; Ignition Systems; Engine Heat transfer and Cooling systems; Engine friction and lubrication systems; Mechanisms for system operations.

UNIT-5

Pollutant Formation and Control

Emission Formation in SI Engines: Constituents, Formation Mechanisms: Hydrocarbon, Carbon Monoxide, Oxides of Nitrogen, Carbon dioxide, Aldehydes; Control Techniques; Fuel Injection Technologies, Heated Oxygen Sensors, Emission formation in CI Engines: Constituents, formation Mechanisms: Carbon Monoxide, Unburned Hydrocarbons, Oxides of Nitrogen, Compounds of Sulphur, Particulate Matter, Control Techniques: Fuel Injection Technology, Electronically Controlled Distribution, Electronic Unit injector System, After Treatment Devices.

Text Books:

- [1].Engineering Fundamentals of internal Combustion Engines, Willard W. Pulkrabek, Printice Hall New Jersey.
- [2].Internal Combustion Engine Fundamentals, John B Heywood, McGraw-Hill Book Company, New York, 1988.

Reference Books

- [1].Internal Combustion Engines Applied Thermosciences, Colin R. Ferguson and Allan T. Kirkpatrick, John Wiley & Sons, 2e, 2004
- [2].Internal Combustion Engines, V. Ganesan, Tata McGraw-Hill, New-Delhi, 1990
- [3].An Introduction to Combustion: Concept and Applications, Stephen R. Turns, McGraw-Hill Education (India), New-Delhi, 2011

List of Experiments

5. Study of various IC engine Components and Sub-systems.
6. Study of Induction and Exhaustion Systems
7. Study of Ignition Systems, Cooling systems, lubrication systems for IC engine systems
8. Simulation and Modeling of Spark Ignition engines
- 4.Simulation and Modeling of Compression Ignition engines
5. Emission measurement in Spark Ignition and Compression Ignition Engines.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO HAVE

The knowledge of internal combustion engine from systems design perspective.

Fundamentals of thermodynamics, Combustion process, Theory of Internal combustion Engines

Devi Ahilya University, Indore, India Institute of Engineering & Technology			1 Year M.E.(Design & Thermal Engg.) Part Time				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTP1G1 Advanced Thermodynamics	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objective: The basic objective of the subject is to deal fundamentals of Thermodynamics, Compressible Fluid Flow properties, Thermodynamics relations & Exergy.

Prerequisite: Basic Engineering Thermodynamics.

COURSE CONTENT

UNIT 1

Mass And Energy Analysis Of Control Volume

Control Volume, Steady Flow Process, Mass Balance and Energy Balance in a Simple Steady Flow Processes, Variable Flow Processes, Comparison of SFEE with Euler and Bernoulli Equations, Examples of a Variable Flow Problems. Illustrative Problems.

UNIT 2

Thermodynamic Property Relations

Mathematic Theorems, Maxwell's Relations, TdS Equations, Heat Capacities, Joule Kelvin Effects, Claussius Clapeyron Equation, Gibb's Phase Rule, General Thermodynamic considerations on an Equation of State. Illustrative Problems

UNIT 3

Exergy

Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency, Exergy Change of System, Exergy of a Closed System, Exergy of a Steady Flow System, Maximum Work Obtainable Conditions, Illustrative Problems

UNIT 4

Vapour Power Cycles

General Aspects, Simple Steam Power Cycle, Rankine Cycle, Reheat Cycle, Ideal Regenerative Cycle, Feedwater Heaters, Exergy Analysis of Vapour Power Cycles, Illustrative Problems

UNIT 5

Finite Time Thermodynamics

General Aspects, Application of principles on Reversible and Irreversible Cycles, Maximum Power Output conditions, Effect of Cycle Irreversibility Parameter on the performance of the Cycles, Performance of Engines working under Maximum Power and Maximum Power Density conditions, Entropy Generation Minimization, Concepts of Virtual Entropy, Illustrative Problems.

Books Recommended:

[1.] Y.A Cengel, *Thermodynamics-An Engineering Approach* , McGraw Hill Companies,2006.

[2.] P.K Nag, *Engineering Thermodynamics* , The McGraw Hill Companies, Third Edition

[3.] G.E Myers, *Engineering Thermodynamics* ,Prentice Hall, Third Edition

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

- Perform Comparison of SFEE with Euler and Bernoulli Equations,
- Mathematic Theorems, Maxwell,s Relations, TdS Equations, Heat Capacities
- Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency
- General Aspects, Application of principles on Reversible and Irreversible Cycles

Devi Ahilya University, Indore, India Institute of Engineering & Technology			1 Year M.E.(Design & Thermal Engg.) Part Time				
Subject Code & Name	Instructions Hours per Week			Credits			
DTP1G2	L	T	P	L	T	P	Total
Non Conventional Energy Systems	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective: The objective of the subject to acquaint the students the renewable energy technological systems, its principle, working, system design and analysis of present systems, to analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.

Pre requisites: Thermal Engineering, Heat and Mass transfer, fluid mechanics, steam engineering, combustion technology.

COURSE CONTENT

UNIT-1

Solar Energy

Solar radiation its measurements and prediction - solar thermal flat plate collectors concentrating collectors – applications - heating, cooling, desalination, power generation, drying, cooking etc - principle of photovoltaic conversion of solar energy, types of solar cells and fabrication. Photovoltaic applications: battery charger, domestic lighting, street lighting, and water pumping, power generation schemes. Design and Thermal analysis.

UNIT-2

Wind Energy

Atmospheric circulations – classification - factors influencing wind - wind shear – turbulence - wind speed monitoring - Betz limit - Aerodynamics of wind turbine rotor- site selection - wind resource assessment - wind energy conversion devices - classification, characteristics, and applications. Hybrid systems - safety and environmental aspects.

UNIT-3

Bio-Energy

Biomass resources and their classification - chemical constituents and physicochemical characteristics of biomass - Biomass conversion processes - Thermo chemical conversion: direct combustion, gasification, pyrolysis and liquefaction - biochemical conversion: anaerobic digestion, alcohol production from biomass - chemical conversion process: hydrolysis and hydrogenation. Biogas - generation - types of biogas Plants- applications Design of bio gas digesters, landfill gas systems and gasifiers.

UNIT-4

Hydrogen and Fuel Cells

Thermodynamics and electrochemical principles - basic design, types, and applications - production methods - Bio photolysis: Hydrogen generation from algae biological pathways - Storage gaseous, cryogenic and metal hydride and transportation. Fuel cell – performance

characteristics ,principle of working- various types - construction and applications.

UNIT-5

Other Types of Energy

Ocean energy resources - principles of ocean thermal energy conversion systems - ocean thermal power plants - principles of ocean wave energy conversion and tidal energy conversion – hydropower – site selection, construction, environmental issues - geothermal energy - types of geothermal energy sites, site selection, and geothermal power plants, MHD, Thermal analysis

Note: HMT Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

6. Sukhatme, S.P., Solar Energy, Tata McGraw Hill, 1984.
7. Twidell, J.W. and Weir, A., Renewable Energy Sources, EFN Spon Ltd., 1986.
8. Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw-Hill, 1978.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

- Working, system design and analysis of present systems, to analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.
- Applications: battery charger, domestic lighting, street lighting, and water pumping, power generation schemes. Design and Thermal analysis.
- Biomass resources and their classification - chemical constituents and physicochemical characteristics of biomass - Biomass conversion processes
- Thermodynamics and electrochemical principles

Devi Ahilya University, Indore, India Institute of Engineering & Technology		I Year ME (Design & Thermal Engg.) Part Time
Subject Code & Name	Instructions Hours per Week	Credits

DTP1G3	L	T	P		L	T	P	Total
Management Information System	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of Management Information System. The subject is useful in understanding the various information sources and database structures.

COURSE OF CONTENT

Unit-1

Introduction to Management Information Systems

An Overview of Management Information Systems, Structure of a Management information System

Survey of Information Systems Technology

Hardware, Software, and Communication technology for Information Systems, Storage and Retrieval of Data, Transaction Processing, Office Automation and Information processing Control Functions.

Unit-2

Conceptual Foundations

The Decision Making Process, Concepts of Information, Humans as information Processors, System Concepts, Concepts of Planning and Control, Organizational Structures and Management Concepts.

Unit-3

Information Based Support System

Support Systems for Planning, Control and Decision Making, Support Systems for Management of Knowledge Work.

Unit-4

Information System Requirements

Developing a Long Range Information System Plan, Strategies for the Determination of Information Requirements, Database Requirements, User Interface Requirements.

Unit-5

Development, Implementation and Management of Information System Resources

Developing and Implementing Application Systems, Quality Assurance and Evaluation of Information Systems, Organizational and Management of the Information Resources Functions, Future Development and Their Organizational and Social Implications.

Text Books

5. Gordan B. Davis and Margrethe H. Olson, "Management Information Systems - Conceptual Foundations, Structures and Development, Mcgeaw Hills International Editions.

Reference Books

6. Laudon, Kenneth C., and Laudon, Jane P., Management Information Systems- Managing Digital Firm, Tenth Edition, Prentice Hall, 2007
7. Management Information Systems, Loudon and Loudon, 10th edition, Pearsons Educations
8. Management Information System, Oz Thomson Learning 5th edition
9. Management Information System, W.S.Jawadekar, 3rd edition, TMH
10. Management Information System, James O'Brien, 7th edition, TMH

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

- Structure of a Management information System.
- , Transaction Processing, Office Automation and Information processing Control Functions.
- Organizational Structures and Management Concepts.
- Developing a Long Range Information System Plan

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Part Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTP1G4	L	T	P		L	T	P	Total
Finite Element Analysis	3	1	0		3	1	0	4
Duration of Theory Paper:								

Objectives & Pre requisites:

The basic objective of the subject is to deal with the fundamentals of Finite Element Methods. The subject is useful in understanding the concept of Solving problems using finite element approach.

COURSE OF CONTENT**Unit-1****Introduction**

Introduction, Approximate Methods of Analysis, Finite Element Method-An Introduction, Different Approaches in FEM.

Unit-2**Finite Elements and Interpolation Functions**

Interpolation Functions, One Dimensional Elements, Two Dimensional Elements, Three Dimensional Elements.

Unit-3**One Dimensional Finite Element Analysis**

Linear Spring, Truss Element, 1D Torsion of a Circular Shaft, 1D Steady State Heat Conduction, 1D Flow Through Porous Media, 1D Ideal Fluid Flow Through Pipes, Beam Element, Analysis of Plane Frames and Grids.

Unit-4**Two Dimensional Finite Element Analysis**

2D Flow through Porous Media, 2D Stress Analysis, Iso-Parametric Formulation, Finite Element Solution of Partial Differential Equations by Method of Weighted Residual, FEM Formulation Based on Variational Principle, Finite Element Solution of Stokes Flow Equations.

Unit-5**Three Dimensional Finite Element Analysis**

Axi-Symmetric Solids, 8 Node Isoperimetric Element for 3D Stress Analysis, Computer Implementation of FEM, Applications of Finite Element Method.

Text Books

- [1] Y. M. Desai, T. L. Eldho, A. H. Shah, "Finite Element Method with Applications in Engineering", Pearson Publication.
- [2] Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, "Concepts and Applications of Finite Element Analysis", Wiley India (P) Ltd.
- [3] Chennakesava R. Alavala, "Finite Element Methods Basic Concepts and Applications", PHI Learning Private Limited.

Reference Books

- [1].Daryl L. Logan, "A First Course in the Finite Element Method", Cengage Learning India.
- [2].V. Ramamurti, "Finite Element Method in Machine Design", Narosa Publishing House.
- [3].Klaus Jurgen Bathe, "Finite Element Procedures", PHI Learning India.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Approximate Methods of Analysis,
- Fluid Flow through Pipes, Beam Element, Analysis of Plane Frames and Grids.
- 2D Flow through Porous Media, 2D Stress Analysis
- Axi-Symmetric Solids, 8 Node Isoparametric Element for 3D Stress Analysis
- One Dimensional Elements, Two Dimensional Elements

Devi Ahilya University, Indore, India Institute of Engineering & Technology	M.E.(Design & Thermal) Part Time
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Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTP2C3	L	T	P	L	T	P	Total
Advanced Machine Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: The objective of the subject is to deal with failure analysis and advanced areas of design of machine elements based on reliability, fatigue, creep. Also deals with the fracture mechanics approach to design.

Prerequisite(s): Pre requisites are Material science, Machine Design I and Machine Design II.

COURSE OF CONTENTS

Unit-I: Introduction to Advanced Mechanical Engineering Design:

Review of materials and processes for machine elements. Case studies of mechanical engineering design failures. Review of static strength failure analysis – theories of failure.

Unit-II: Reliability and Optimum based Design :

Introduction to optimum design, analysis of simple machine members based on optimum design.

Fundamentals of reliability, System concepts in Reliability engineering. Failure distributions,

Statistical analysis of failure data, Weibull analysis, dimensioning.

Unit-IV: Design for Dynamic Loading:

High cycle and low cycle fatigue, Fatigue strength. Design of Mechanical Equipment Elements. Exercises of fatigue design of shafting and gears. Exercises of surface fatigue design of rolling contact bearings including linear bearings.

Unit-IV: Design for Creep:

Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

Unit-V: Fracture mechanics:

Introduction: Fracture mechanics approach to design, the energy criterion, the stress intensity approach, effect of material properties on fracture, dimensional analysis in fracture mechanics. Fundamental concepts: Stress concentration effect of flaws, the Griffith energy balance, the energy release rate, instability and the R curve, stress analysis of cracks, K as a failure criterion. Fracture toughness testing of metals

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Text Books:

- [1].Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003
- [2].Dieter G.E., *Engineering Design*, McGraw-Hill 2000.
- [3].Mubeen., *Machine Design*, , Khanna Publications(P) Ltd.,2004

Reference Books:

- [1].Spotts M.F.,Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006
- [2].Shariff A.,*Design of Machine Elements*,Dhanpat Rai Publications(P) Ltd.,3e,1995

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO HAVE

The failure analysis and advanced areas of design of machine elements based on reliability, fatigue, creep. Also deals with the fracture mechanics approach to design.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E. (Design & Thermal Engg.) Part Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week						
DTP2E2	L	T	P	L	T	P	Total
Fatigue Creep and Fracture	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject

The objectives of this course will be achieved by learning the phenomenon of fatigue creep & fracture Mechanism inside the metallic bodies also the behavior of the material can be understand under these states.

Prerequisites

Strength of Material, Machine Design & Material Science.

COURSE CONTENT

UNIT-1

Introduction

Introduction & types of fatigue creep & Fracture phenomenon. Stress Analysis under fatigue, creep & Fracture. Material selection under the given conditions.

UNIT -2

Fatigue

Types of fatigue leading and failure, Fatigue test, endurance limit, S-N diagram; Various failure relations, Viz., Soderberg, Modified Goodman-, Gerber parabolic-, Elliptical-relations; Factors influencing fatigue strength; Influence of stress concentration on fatigue test; Fretting corrosion; Effect of environment-corrosion fatigue; Increased fatigue life due to surface protection.

UNIT -3

Creep

Mechanics of creep, inter-granular, trans-granular creep, Creep test, Creep strain rate-time curves, Deformation mechanism map; High temperature properties of materials; Long time creep-stress-time relations; Creep contribution to the fracture mechanism; Creep contribution to the fracture mechanism; DVM, DVL German-standard, Hatfield time yield test.

UNIT -4

Fracture

Damage tolerance analysis, residual strength in presence of cracks; Mechanisms of crack growth and fracture; Basic modes of fracture; Stress Concentration factor, state of stress at a

stress concentration, load-flow-times; Measurement of Collapse strength; Griffith's theory of brittle fracture; Irwin's theory of fracture in elastic-plastic materials; Theories of linear elastic plastic fracture mechanics (LEFM); Stress intensity fracture, toughness, stress distribution at crack tip: plane stress, plane strain cases; Theories of elastic plastic fracture mechanics (EPFM); Crack opening displacement (COD) Criterion, COD tests, crack tip opening displacement (CTOD) measurement; Crack arresters; Implementation of fracture control.

UNIT -5

Design against Creep

Types of creep, Introduction to Design against creep. Combined creep and fatigue failure prevention. Shearby Dorn Parameter, Larson Miller Parameter, Manson- Haferd Parameter.

BOOKS RECOMMENDED:

- [1]. Norman E. Dowling, "*Mechanical Behavior of Materials: Engineering Methods for Deformation*,"
- [2]. *Fracture, and Fatigue*," 3rd edition, Pearson Prentice Hall, 2007.
- [3]. Shigley J.E. , "*Mechanical Engineering Design*" McGraw Hill 2003.
- [4]. Mubeen A. , "*Machine Design* " Khanna Publications (P) Ltd

COURSE OUTCOMES:

Have the phenomenon of fatigue creep & fracture Mechanism inside the metallic bodies also the behavior of the material can be understand under these states.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTP2E3	L	T	P	L	T	P	Total
Mechanism and Robot Kinematics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: The objective of the subject is to introduce the students about the basic analytical techniques and fundamental principles of Robot Kinematics. The Pre requisites are knowledge of the basic course in theory of machines, matrix theory, probability, computer programming and mathematical analysis.

COURSE CONTENT

UNIT-1

Introduction to Robotics & Mechanisms

Introduction, Automation and Robotics, Robot anatomy and Robot configurations, Links and joints notations, End effectors, Work volume and Obstacles, Overview of Robot drive systems and Control systems, Robot sensing, Dynamic performance and Precision of movement, Applications in Robotics.

UNIT-2

Robot Arm Kinematics

Introduction, Forward or direct Kinematics Problem, Matrix Representations, Robot arm coordinates and Transformation matrix, Composite homogeneous transformation matrix, Denavit-Hartenberg representation, Kinematic equations, Location of end effector, Inverse kinematic problem, Geometric approach for solution of inverse kinematic problem.

UNIT-3

Trajectory Planning

Introduction, Constraints and Path specifications, Basic algorithm for generation of joint trajectory, joint interpolated trajectories, Cartesian path trajectory planning.

UNIT-4

Robot Arm Control.

Fundamentals of control system theory, Joint motion controls: Servo mechanism, Computed torque technique, Minimum time control, Variable structure control. Adaptive control modes.

UNIT-5

Robot Programming and Task Planning

Introduction, Characteristics of robotic programming languages, position and motion specification, development and debugging facilities, task-level programming and robot programsynthesis, Robot intelligence and task planning.

BOOKS RECOMMENDED:

- [1].Mikell P.Groover, *Industrial Robotics*, McGraw Hill Pvt. Ltd., New Delhi.
- [2].K. S. Fu, R. C. Gonzalez, C. S.G. Lee, *Robotics: Control, Sensing, Vision and Intelligence*, McGraw Hill Book Company, Singapore, International Edition 1987.
- [3].Robert J. Schilling, *Fundamentals of Robotics: Analysis & Control*, Prentice-Hall of India Private Limited, New Delhi, 5th Reprint, 2003

COURSE OUTCOMES:**AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO HAVE:**

- Techniques and fundamental principles of Robot Kinematics
- Robot anatomy and Robot configurations, Links and joints notations, End effectors, Work volume and Obstacles
- Constraints and Path specifications, Basic algorithm for generation of joint trajectory

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) PartTime			
Subject Code & Name	Instructions Hours per Week			Credits			
DTP2E4	L	T	P	L	T	P	Total
Thermal Systems : Simulation and Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective of the Subject:

The basic objective of the subject is to have goal of achieving a workable system and of designing an optimum system. The possibility of optimization represents one of the few facets of this subject.

Pre requisites: Thermodynamics, Heat & Mass Transfer.

UNIT- 1

Designing a Workable System and its Economics:

Steps in Arriving at a Workable System, Creativity in Concept Selection, Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.

UNIT- 2

Dynamic Behaviour of Thermal Systems:

Dynamic Analysis, One Dynamic Element in a Steady State Simulation, Laplace Transformers, Inversion of Laplace Transforms, Feedback Control Loops, Time Constants Blocks, Cascaded Time Constant Blocks, Stability Analysis..

UNIT- 3

Modelling Thermal Equipment:

Using Physical Insight, Selecting vs Simulating a Heat Exchanger, Evaporators and Condensers, Condensation of a Binary Mixture, Overview of Search Methods, Assessment of Single Variable Searches.

UNIT-4

System Simulation:

Description of System Simulation Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion, Newton Raphson Method with Multiple Equations.

UNIT- 5

Optimization:

Levels of Optimization, Mathematical Representation of Optimization Problems, Linear Programming, Setting up the Mathematical Statement, Calculus Methods of Optimization, Expansion of Lagrange Multiplier Equations, Unconstrained Optimization.

BOOKS RECOMMENDED

- [1].Cengel YA.,*Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e,2002.
- [2].Stoecker, WF. *Design of Thermal Systems* ,McGraw Hill International Editions, New Delhi, 2007
- [3].Woodson,TT. *Introduction to Engineering Design*, McGraw Hill, New York, 1996.
- [4].Rudd, DF. *Strategy of Process Design*, McGraw Hill, New York, 1996

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Understand concept of Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.
- Can Selecting vs Simulating a Heat Exchanger, Evaporators and Condensers, Condensation of a Binary Mixture, Overview of Search Methods
- Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

**SCHEME OF EXAMINATION (CBCS)
&
COURSE OF CONTENTS**

**BE I Year Programme
(Common to All Branches)
Effective from July 2015**

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

**DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY**

**CBCS SCHEMES OF EXAMINATION FOR BE I PROGRAMME
(Subject to Revision)**

B. E. I YEAR (Common to all branches)

(Computer Engineering, Information Technology and Civil Engineering*)

SEM - 1				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	AMR1C1	Applied Mathematics-I	3-1-0	PC1
2.	ACR1C2	Chemistry & Environment Science	3-1-1	PC2
3.	MER1C3	Elements of Mechanical Engineering	3-1-1	PC3
4.	ETR1C4	Basic Electronics	3-1-1	PC4
5.	MER1C5	Workshop Practise	0-1-2	PC5
6.	SSR1S1	Technical English	3-1-0	SS1
7.	BER1V1	Comprehensive Viva I	0-0-4	Viva1
Total Credit for SEM I			26 actual + 4 Virtual credits	

SEM - 2				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	AMR2C1	Applied Mathematics-II	3-1-0	PC1
2.	APR2C2	Applied Physics	3-1-1	PC2
3.	MER2C3	Engineering Drawing	2-1-2	PC3
4.	EIR2C4	Electrical Engineering	3-1-1	PC4
5.	COR2C5	Computer Programming in C++	3-1-1	PC5
6.	SSR2S2	Humanities	2-0-0	SS2
7.	BER2V2	Comprehensive Viva II	0-0-4	Viva2
Total Credit for SEM II			26 actual + 4 Virtual credits	

2. Semester 1 for three branches and Semester 2 for other three branches for the teaching load balancing.

**DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY**

**CBCS SCHEMES OF EXAMINATION FOR BE I PROGRAMME
(Subject to Revision)**

B. E. I YEAR (Common to all branches)

(Mechanical Engineering, Electronics & Telecommunication Engineering and Electronics & Instrumentation Engineering*)

SEM - 2				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	AMR2C1	Applied Mathematics-II	3-1-0	PC1
2.	APR2C2	Applied Physics	3-1-1	PC2
3.	MER2C3	Engineering Drawing	2-1-2	PC3
4.	EIR2C4	Electrical Engineering	3-1-1	PC4
5.	COR2C5	Computer Programming in C++	3-1-1	PC5
6.	SSR2S2	Humanities	2-0-0	SS2
7.	BER2V2	Comprehensive Viva II	0-0-4	Viva2
Total Credit for SEM II			26 actual + 4 Virtual credits	

SEM - 1				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	AMR1C1	Applied Mathematics-I	3-1-0	PC1
2.	ACR1C2	Chemistry & Environment Science	3-1-1	PC2
3.	MER1C3	Elements of Mechanical Engineering	3-1-1	PC3
4.	ETR1C4	Basic Electronics	3-1-1	PC4
5.	MER1C5	Workshop Practice	0-1-2	PC5
6.	SSR1S1	Technical English	3-1-0	SS1
7.	BER1V1	Comprehensive Viva I	0-0-4	Viva1
Total Credit for SEM I			26 actual + 4 Virtual credits	

6. Semester 1 for three branches and Semester 2 for other three branches for the teaching load balancing.

Semester 1

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 1			
Subject Code & Name	Instructions Hours per Week			Credits			
AMR1C1: Applied Mathematics-I	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Course Objectives: To introduce the mathematical concepts of calculus for solving engineering problems that shall be used in various branches of engineering.

Prerequisite(s): Nil

COURSE OF CONTENTS

UNIT-I

Differential Calculus: Review of Successive differentiation, Leibnitz theorem and problems; Expansion of functions by Taylor's and Maclaurin's Theorem; Asymptotes; Curvature in Cartesian and Polar Coordinates; Envelopes; Evolutes and Involutes.

UNIT-II

Advanced Differential Calculus: Function of Several Variables; Partial Differentiation; Approximations and errors; Jacobians; Taylor's Series of Two Variables; Maxima and Minima of Function of Two and More Variables; Lagrange's Method of Undetermined Multipliers.

UNIT-III

Integral Calculus: Beta and Gamma functions; detailed study of tracing of curves-Cartesian, polar and parametric curves; Area; Length of Curve; Volume; Surface of Revolution; Theorems of Pappus and Guldin and problems.

UNIT-IV

Advanced Integral Calculus: Multiple integrals: Double and Triple Integration; Change of Order of Integration; Area; Volume; Centre of Gravity; Moment of Inertia.

UNIT-V

Vector Calculus: Differentiation of a Vector; Gradient; Divergence; Curl; Integration of a Vector Function; Gauss's, Green's and Stoke's Theorems.

BOOKS RECOMMENDED

5. B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
6. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
7. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
8. C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
9. H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
10. E Mendelson, G J Hademenos, F Ayres, Schaum's Easy Outline: Calculus, McGraw-Hill, 2000.
11. R C Wrede, M Spiegel, Schaum's Outline of Advanced Calculus, 2/e, McGraw-Hill, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE -I Year (Common to all branches) Semester- 1			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ACR1C2:	L	T	P	L	T	P	Total
Applied Chemistry & Environmental Science	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives: This course is designed with two objectives: first to learn chemistry of various engineering materials, their properties, testing, structure-property relationship and their applications in various technologies. Secondly to aware with various environmental issues and pollution and control studies in modern society.

Prerequisite: Nil

COURSE OF CONTENTS

UNIT-I WATER AND ITS APPLICATIONS

Sources, impurities, applications, Hardness- its expression and determination; Boiler troubles and their causes; Industrial water requirement, Treatment of water for industrial purpose; De-ionization of water; Analysis of water; Water quality parameters, Numerical problems on water analysis and water treatment processes.

UNIT-II ENGINEERING MATERIALS AND TESTING

Introduction, classification and requirement of engineering materials. Material testings.

Polymers: Chemistry of polymer materials and their diversification; Types of polymerization and their brief account; Examples of polymers.

Cement, Glass and Refractories: Different types, composition, properties and uses.

UNIT-III LUBRICANTS

Introduction, Principle and functions of applications of solid, semi-solid and emulsions. lubrication, Types of lubricants, Properties, tests and liquid lubricants; Synthetic lubricants and lubricating emulsions.

UNIT-IV INSTRUMENTAL TECHNIQUES IN MATERIAL CHARACTERIZATION

Classification, Lamberts and Beers Law; Introduction, Principle and applications of Colorimetry, IR, UV-Vis, NMR and Mass spectroscopy; Chromatographic Techniques and applications, Numerical Problems on spectroscopic techniques.

UNIT-V ENVIRONMENTAL SCIENCE

Components of Environment and their interactions, Natural resources, Ecosystem, Impacts of development of environment, Environment protection act, EIA, Sustainable development.

Pollution and its types, Description, effects and control measures of Air, Water, Land and Noise pollution, Chemical toxicology, Global warming, Depletion of ozone layer, Acid rains, Eutrophication, Rain water harvesting, Pollution case studies.

BOOKS RECOMMENDED:

4. Jain & Jain, Engineering Chemistry, Dhanpat Rai Publications, 2007.
5. S. S. Dara, A Text Book of Engineering Chemistry, S. Chand & Company, 2007.
6. B. Joseph, Environmental Studies, Tata McGraw Hill.
7. A.K. De, Environmental Chemistry, New Age International, 1996.
8. Shashi Chawala, A Text Book of Engineering Chemistry, Dhanpat Rai Publications, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE-I Year (Common to all branches) Semester-1				
Subject Code & Name	Instructions			Credits			
	Hours per Week						
MER1C3:	L	T	P	L	T	P	Total
Elements of Mechanical Engineering	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To understand the basic fundamentals of Mechanical Engineering in light of thermal engineering and production engineering and to provide an insight about the basic thermal and production processes, materials, components and applications.

Prerequisites: Nil.

COURSE OF CONTENTS

UNIT I

Thermodynamics and energy, Temperature and Zeroth law of thermodynamics, Systems and control volume, Properties of a system, Energy transfer by heat and work, First law of thermodynamics, Energy analysis of closed systems, Internal energy and enthalpy of ideal gases, Energy analysis of steady flow systems, Analysis of some steady flow engineering devices, Relevant review problems.

UNIT II

Properties of pure substance, p-v and T-s diagram for a pure substance, Mollier diagram for a pure substance, Quality or dryness fraction, Steam tables, Methods for measurement of steam quality, Relevant review problems.

UNIT III

Basic considerations in the analysis of power cycles, Air standard assumptions, Overview of reciprocating engines, Thermodynamic analysis of Otto cycle: Ideal cycle for spark ignition engines, Thermodynamic analysis of Diesel cycle: Ideal cycle for compression ignition engines, Comparison of Otto and Diesel cycles, Effect of Specific Heat and Dissociation on the performance of the cycles, Relevant review problems.

UNIT IV

Metal Casting: Classification and overview of metal casting processes: sand casting, expandable mould casting and permanent mould casting; Patterns, cores and moulding; Elements of gating systems; Heating, pouring and solidification; Casting quality: cleaning, finishing and defects.

UNIT V

Welding and Machining: Fundamentals of welding and overview of welding processes: Oxy-Acetylene gas welding, Arc welding: TIG, MIG, SAW etc., Resistance welding; Soldering & Brazing; weld quality and defects; Fundamentals of metal machining and introduction to turning and related operations; Constructional features of lathe, Geometry of single point cutting tool and cutting tool materials.

BOOKS RECOMMENDED:

9. Nag P K, Engineering Thermodynamics, The McGraw-Hill Companies, Fourth Edition.
10. P N Rao, Manufacturing Technology, Vol. I and Vol.2 Tata McGraw-Hill, 4th Edition, 2014.

11. Hajra & Chaudhary, Work Shop Technology, Vol. 1 & 2, 12th Edition, Media Promoters & Pub, 2007.
12. Cengel Y A, Boles M A, Thermodynamics-An Engineering Approach, The McGraw-Hill Companies, Fifth Edition.
13. Mikell P. Groover, Fundamentals of Modern manufacturing, 3rd Edition, John Wiley and Sons.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE-I Year (Common to all branches) Semester- 1				
Subject Code & Name	Instructions			Credits			
	Hours per Week			L	T	P	Total
ETR1C4: Basic Electronics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: To introduce the basic concepts of electronics along with the understanding of working fundamental circuit devices such as diode, transistors and opamp.

Prerequisite(s): nil

COURSE OF CONTENTS

UNIT I

Discrete electronic devices: Diode, zener diode, BJT (Bipolar junction transistor), LED, photodiode phototransistor, varactor; characteristic and operation (qualitative description and quantitative behaviour with black box approach)

UNIT II

Diode circuits; clipper, clamper circuits, DC power supply: rectifier-half wave, full wave (center tapped, bridge), zener regulated power supply, regulation (with regulator IC-LM317)

UNIT III

BJT characteristics; BJT biasing; CE-biasing circuits: operating point; h-parameter model of transistor; large/small signal models (concept); large/small signal models of CE-BJT amplifier, Design of amplifier; Differential amplifier (using BJT).

UNIT IV

Operational amplifier: basic model; virtual ground concept; inverting amplifier; non-inverting amplifier; integrator; differentiator; Schmitt trigger; astable multivibrator, Simple active filters: low pass, high pass, bandpass, notch filter

UNIT V

Basic feedback theory; +ve and -ve feedback; concept of stability; oscillator, Waveform generator using op-amp schmitt trigger for Square wave, triangular wave Wien bridge oscillator for sinusoidal waveform

BOOKS RECOMMENDED:

9. Ralph J.Smith, R.C.Dorf circuits, devices and systems, John Wiley, 1992.
10. R.L.Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002.
11. A. S. Sedra, K.C. Smith, Microelectronic circuits, Oxford University Press, 1998
12. R.A. Gayakwad, OP-amps and linear integrated circuits, Prentice Hall of India.
13. Millman, Grabel, Microelectronics, Mc-Graw-Hill.
14. De Carlo, and Lin, Linear circuit analysis, Oxford University Press, 2001 (second edition).
- [7] Hayt, Kammerly and Durbin, Engineering Circuit Analysis, Tata McGraw Hill, sixth edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 1			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
SSR1S1: Technical English	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Course Objectives: To develop the English/communication skills in terms of reading, writing and understanding of engineering terms with the improved technical English and to be able to express the technical ideas.

Prerequisite(s): Nil

COURSE OF CONTENTS

UNIT I

Basic of technical communication: Meaning of technical communication; process of communication; Forms of communication: Verbal and Non-verbal; technology-enabled communication; Barriers to communication; Essentials of effective communication; Types of communication; Defining audiences for technical communication; Aspects of communication: Global, Ethical and Legal.

UNIT II

Professional correspondence: Qualities of professional correspondence: Goodwill techniques; Types of correspondence: Letters, Memos, E-mails; Business Letters: Elements of a Letters, Basic Letter Formats; Types of Business Letters: Positive Letters, Negative Letters, Inquiry Letters, Sales Letters, Complain and Adjustment Letters. Memos: Meaning and Format of Memos. Writing job application letters & Designing Resumes; Meeting and Minutes.

UNIT III

Technical Writing: Meaning & Concept of Technical Writing: Process of Technical Writing: Forms of Technical Writing: Technical Description, Summaries, Instructions & User Manuals: Technical Reports: Meaning and Essentials of Good Report Writing: Classification of Reports; Report Formats: Formal and Informal; Common Informal Technical Reports: Progress Reports, Lab Reports, Feasibility reports, Problem Solving Reports.

UNIT IV

Reading Comprehension; Precis Writing; Expansion of an idea; Dialogue Writing; Paragraph Writing (Related to Technical Communication).

UNIT V

Foreign Words & Phrases; Antonyms and Synonyms; Transitional Words and Phrases; Articles, Use of Prepositions, Modal Verbs, Connectives, Relative Clauses, Noun/Nominal Compounds: Correction of Sentences and Homophones; Punctuation, Abbreviations, Capitalization and Number Usage; Use of Technical Words and Jargons.

BOOKS RECOMMENDED:

6. A. Esenberg, A Beginner's Guide to Technical Communication, McGraw-Hills.
7. A. J. Rutherford, Basic Communication Skills for Technology, Pearson Education Asia.
8. C. L. Bovee, J. V. Thill & B Schatzman, Business Communication Today, 7/e, Pearson Education, 2002.

9. R. V. Lesikar, J. D. Perrit, Jr., & ME Flatley, Lesikar's Basic Business Communication.
10. R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Tata McGraw-Hill, 2002.

Semester 2

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE I Year (Common to all branches) Semester- 2				
Subject Code & Name	Instructions Hours per Week			Credits			
AMR2C1: Applied Mathematics-II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Course Objectives: To introduce the mathematical concepts of Matrix Algebra, Probability, and Differential Equation for solving engineering problems that shall be used in various branches of engineering.

Prerequisite(s): Nil

COURSE OF CONTENTS

UNIT-I

Matrix Algebra: Review of Matrices; Elementary Operations on Rows and Columns; Normal Form; Linear Dependence; Rank; Application of Rank Theory in Solving System of Linear Equations; Linear Transformation; Orthogonal, Unitary and Hermitian Matrices; Characteristic Equation; Eigen- Values and Eigen-Vectors; Caley-Hamilton Theorem; Quadratic and Linear forms.

UNIT-II

First Order Ordinary Differential Equation: Exact Differential Equation; Equations Solvable for x, y and p; Clairaut's Form; Application to Simple Problems.

Higher Order Ordinary Differential Equation: Linear Differential Equations with Constant & Variable Coefficients; Method of Variation of Parameters, Simultaneous Differential Equations; Application to Simple Problems.

UNIT-III

First Order Partial Differential Equations: Formation of Partial Differential Equations; Partial Differential Equations of First Order and First Degree i.e. $Pp + Qq = R$.

Higher Order Partial Differential Equations: Linear Homogenous Partial Differential equations of n^{th} order with constant coefficients; method of Separation of variables; their Simple applications.

UNIT-IV

Probability and Statistics: Conditional Probability, Baye's Theorem; Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting, Correlation and Regression Analysis.

UNIT-V

Theory of Equations: Polynomial equations, relation between root and coefficients, symmetric functions of roots, cube roots of unity, Cardon's method for solution of cubic equations.

Fuzzy sets: Membership function, definition, Operations on Fuzzy sets, Properties of Fuzzy sets.

BOOKS RECOMMENDED:

11. B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
12. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
13. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
14. C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
15. H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
16. Zafar Ahsan, Differential Equation and their Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
17. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons., 2000.

- [4] Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
- [5] G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
- [6] H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, 1996.
- [7] Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3rd Edition, John Wiley & Sons, Inc., 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE - I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
APR2C2: Applied Physics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To introduce the fundamental concepts of physics that are useful in solving problems of engineering especially for semiconductors, optics, electromagnetism and quantum mechanics.

Prerequisite(s): nil

COURSE OF CONTENTS

UNIT-I

Optics-I: Interference of Light Waves: Thin film, Newton's Ring experiment, Michelson interferometer; Diffraction of Light Waves: Fresnel's & Fraunhofer diffraction, Zone plate, Single slit experiment, diffraction by double slit, Diffraction at Circular aperture, Plane transmission Grating.

UNIT-II

Optics-II: Polarization of Light Waves, Double refraction, Nicol Prism, Half Wave & Quarter Wave plates, Circularly & elliptically polarized light, Polarimeter; LASER: Stimulated & spontaneous emission, Population Inversion, Optical Resonator, Einstein's coefficients, He-Ne Laser, Co2 Laser, Semiconductor Laser; Optical Fiber: types of Fibers (material, refractive index, mode), Acceptance angle, Numerical aperture, V-Number, Propagation of Light through Fibers, Applications.

UNIT-III

Crystal Structure and Semiconductors: Symmetry & properties of Simple crystal structure, Miller's Indices, Interplanar spacing, production and properties of x-ray, Bragg's law; Semiconductors: Band theory of Semiconductors, Intrinsic & extrinsic semiconductors, Fermi level, pn junction diode, LED, Zener diode, npn & pnp Transistors.

UNIT-IV

Electromagnetism: Continuity equation for Charge & Current, Inconsistency of Ampere's law for time varying field, Concept of Displacement current, Maxwell's equations; Wave equations for E & H, Propagation of one dimensional electromagnetic waves in dielectric medium, Energy density in electromagnetic field: Poynting Vector.

UNIT-V

Quantum Physics: Plank's law, Compton's effect, Concept of Matter Waves, Devison & Germer's experiment, Phase velocity & Group velocity, Heisenberg's Uncertainty Principle; Schrodinger's Wave Equation, Interpretation of Wave function Ψ , Time dependent & Time Independent equations, Schrodinger's Wave equation for a free particle in a box.

BOOKS RECOMMENDED:

4. R K Gaur & S L Gupta, Engineering Physics, Dhanpat Rai & Sons, 2006
5. H.K. Malik & A.K.Singh, Engineering Physics, Tata McGraw Hill, 2011
6. N. Gupta & S.K. Tiwary, A Text Book of Engineering Physics, Dhanpat Rai & Co. 2009.
7. W. T. Silfast, Laser Fundamentals Cambr. Un. Press, 1996,
8. D Halliday & R Resnick, Physics Vol-II, Wiley Eastern, 1993
9. H White, Modern Physics: Van Nostrand; 15/e.
10. D P Khandelwal, Optics and Atomic Physics.
11. R Feynman, Feynman Lectures on Physics, /e, Narosa Publication, 1998.
12. S.O. Pillai, Solid State Physics, New Age International Publication, 2010.

- R.S. Sedha, A Text Book of Applied Electronic, S. Chand & company Lmt. 2005.
- R.P. Goyal, Unified Physics-II,,and III Shivlal Agrawal & Co. ,1994.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions Hours per Week			Credit s			
MER2C3: Engineering Drawing	L	T	P	L	T	P	Total
	2	1	4	2	1	2	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To understand the concepts of imagining, envisioning and visualizing the objects & machine parts and drawing them with the instruments & tools.

Prerequisite(s): Nil

COURSE OF CONTENTS

UNIT-I

Introduction, need & Classification of Engineering Drawings, Drawing Instruments and their uses, Indian Standards for Drawing, Drawing Sheet Layout, Various conventions used in drawing, Technical Lettering, Dimensioning, Basic Geometrical Constructions. Engineering Scales & Engineering Curves

UNIT - II

Orthographic Projections, Isometric Projections, Oblique Projections, Perspective Projections & Missing Views.

UNIT - III

Projection of Points, Straight Lines and Plane Surfaces.

UNIT - IV

Projection of Solids, Section of Solids and Development of Surfaces.

UNIT - V

Interpenetration of Solids / Intersection of Surfaces, Introduction to Computer Aided Drawings, Drawing of Machine elements like Riveted Joints, Screw fasteners and Welded Joints.

BOOKS RECOMMENDED:

- Bhatt N D, Engineering Drawing, Charoter Publishing House, Anand, Gujrat Agrawal B, and Agrawal C M, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited.
- French T E, Vierck C J, Foster R J, Engineering. Drawing and Graphic Technology Mc Graw-Hill International, Singapore, Low Price Edition.
- Luzadder W J, Duff J M, Fundamentals of Engineering Drawing, Prentice- Hall India, New Delhi.
- Dhananjay A Jolhe, Engineering drawing, Tata McGraw Hill.
- Shah M B and Rana B C, Engineering Drawing, Pearson Education, New Delhi.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE - I Year (Common to all branches) Semester- 2				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR2C4: Electrical Engineering	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: To understand the concepts and practical ideas of AC/DC circuits, Electromagnetic Circuits, Transformers and Electric Machines those are basic to all the engineering streams.

Prerequisite(s): nil

COURSE OF CONTENTS

UNIT-I

AC circuits: Generation of EMF, Phasor Quantities, RMS, Average, Form Factor, Peak Factor Etc, Phasor Diagrams; Single Phase AC Circuits: R, L, C And Combinations, Resonance, Q-Factor, Bandwidth; Three Phase AC Circuits: Generation, EMF, Phase Sequence, Analysis of Star and Delta Connections, and Power Measurement In Single Phase & Three Phase Circuit.

UNIT-II

Circuit analysis tools: Kirchoff's laws, Analysis of DC and AC circuits, Thevenin's theorem, Norton's theorem, Max power transfer theorem, Superposition theorem, and Source transformation .

UNIT-III

Magnetic Circuits: Electromagnetism, Magnetic flux, Magnetic flux density, Intensity of magnetization, B-H curves, hysteresis and eddy current losses, Magnetic circuit calculations, laws of Electro-magnetic induction, Magnetic induction, Lifting power of an electromagnet.

UNIT-IV

Transformer: Construction, principle, ideal transformer, EMF equations, Analysis of transformer on no load and load conditions, Equivalent resistance and reactance, voltage regulations, transformer losses Transformer testing, transformer efficiency, Types of transformer, Cooling methods, Auto transformer.

UNIT-V

Rotating electric Machines: Construction, working principles, EMF equations, Characteristics, Torque equations of DC machines (generators & motors), 3-phase synchronous and induction motor, single phase induction motor.

BOOKS RECOMMENDED:

5. V Del Toro, Electrical Engineering Fundamentals, 2/e, PHI, 2000.
6. D P Kothari, I J Nagrath, Basic Electrical Engineering, 2/e, Tata McGraw Hill, 2002 (Fifth Reprint 2003).
7. A Sudhakar, Network Theory, 2/e, Tata McGraw Hill, 2004
8. P S Bimbhara, Electrical Machinery, 7/e, Khanna Publishers, New Delhi, 2006.

Devi Ahilya University, Indore, India				BE I Year (Common to all branches)				
Institute of Engineering & Technology				Semester-2				
Subject Code & Name		Instructions Hours per Week			Credits			
COR2C5: Computer Programming in C++		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Course Objectives: To provide introduction to problem solving with computers using a modern language C++, Perform object oriented programming and to demonstrate relevance of object oriented programming in developing solutions to engineering problems demonstrating usage of data abstraction, encapsulation, and inheritance, To learn exception handling techniques.

Prerequisites: Nil.

COURSE OF CONTENTS

UNIT-I

Introduction to flowcharts and problem solving. Types of programming languages, Programming with C++:- C++ Data Types:-auto, bool, int, char, float, double, void. Variables and Constants, Operators, Arithmetic and Logical Expressions, Assignment Statements and Type Casting. Control structures- Iteration statements, Jump Statements and Selective statements. Common C++ Header files, Generation of Random numbers in C++.

UNIT-II

Functions: Introduction - Call by Value and Call by Reference – return values – recursion – Arrays - Introduction to Arrays - Initialization of Array - Multi dimensional Arrays - passing arrays to functions – Strings - Arrays of Strings - Standard Library String Functions.

Structures: Structure elements, Nested Structures, Array of Structures, Array within structures and passing structures to functions.

Unit- III

Pointers:-Declaration and Initialization of Pointers, Dynamic Memory allocation/deallocation operators:-new and delete. Pointers and Arrays:-Array of Pointers, Pointer to an array, Function returning a pointer, Reference variables and use of alias. Invoking functions by passing pointers. Files – Introduction – File Structure - File handling functions - File Types - Error Handling.

UNIT-IV

Object Oriented Programming Paradigm - Basic Concepts of OOP - Benefits of OOP. Class and object fundamentals and various visibility modes in class, Object as function arguments-pass by value and pass by reference. Constructor:-Special Characteristics, Declaration and Definition of a Constructor, Default Constructor, Overloaded Constructor, Copy Constructor and Constructor with default arguments.

Function Overloading:-Need and restrictions of overloaded functions, Steps involved in finding the best match, Default arguments versus overloading.

Destructor:- Special Characteristics, Declaration and Definition of a Destructor. Friend function and its characteristics and friend class.

UNIT-V

Introduction to Operator overloading - Rules for Operator overloading – overloading of binary and unary operators - Introduction to inheritance – Types of inheritance - Abstract Classes - new Operator and delete Operator - Pointers to Objects – this Pointer - Virtual Functions - Pure Virtual

Functions - Introduction to Class Templates - Function Templates - Member Function Templates - Basics of Exception Handling - Types of exceptions - Exception Handling Mechanism - Throwing and Catching Mechanism - Rethrowing an Exception - Specifying Exceptions.

BOOKS RECOMMENDED:

8. Coohoon and Davidson, C++ Program Design: An introduction to Programming and Object-Oriented Design (3rd edition), Tata McGraw Hill, New Delhi, 2003.
9. Herbert Schildt, the Complete Reference, Tata McGraw Hill.
- 10.E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education.
- 11.Ravichandran, Programming With C++, Tata McGraw Hill.
- 12.Dromey G, How to solve it by Computer, Prentice Halll – 1978.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
SSR2S2: Humanities	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Course Objectives: To learn the human values and ethical values that are essential for an Engineer to practice in the day to day life during the field work while working with the society.

Prerequisite(s): nil

COURSE OF CONTENTS

UNIT-I

Man and society- Theories of man and society, Methodological individualism, structuralism, Society and its features- Social Institutions; Social Stratification and Change; Contemporary Indian Philosophy-its characteristics and Cross-cultural Issues.

UNIT-II

Human Behavior: Biological Bases of Behavior, Methods for understanding human psychophysiology, Working of brain, Psychobiology of learning, memory, emotions and personality, Temperament and personality: trait structure and persistence, Extraversion/sociability, Aggression-hostility/agreeableness, Philosophy of Mind & Cognition. Concepts of good life – quality of life and subjective well-being; happiness, life satisfaction, and positive affect.

UNIT-III

Perspectives on Knowledge, Science and Technology, Technological Shaping of Society and Social Shaping of Technology and its Human roots, Role of Humanities in Engineering: Professionalism in Engineering; Professional Engineering Bodies.

UNIT-IV

Governance and Engineers: Political parties; Types & Forms of Governance; Utilitarianism; capitalism, socialism and communism; Marxist and neo-Marxist thoughts; democracy in public and private spheres.

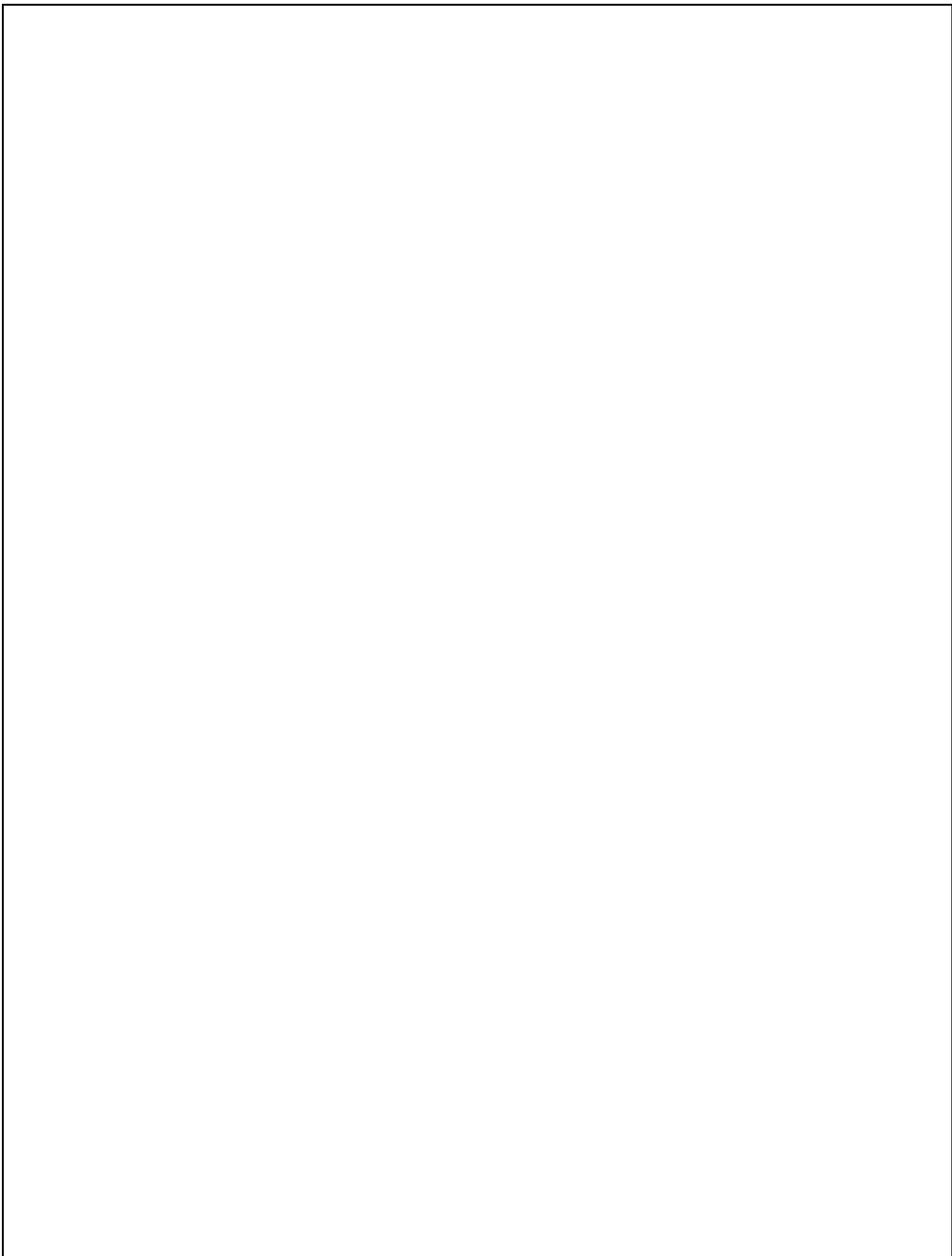
UNIT-V

Engineering and Corporate Social responsibility- Ecology and Natural Resources, Role of corporations in the society, Morals, Values, Consciousness, Experience: Basic codes of Ethics; Engineering Ethics, Evolution of CSR, Strategic CSR, Role of stakeholders in CSR, Consumer awareness towards CSR, CSR as competitive advantage, the Global Competitiveness Index (GCI) & Sustainability, Issues in CSR- organizational, economic & social.

BOOKS RECOMMENDED:

6. D J Kemper, Introduction to Engineering Profession, 2/e, Suanders Publication, 1998.

7. A S Chauhan, A Text Book of Social Science Jain Brothers 9/e, 2008.
8. R C Agrawal, Principle of Political Science.
9. NPTEL
10. W.B. Werther & D. Chandler, Strategic Corporate Social Responsibility, Thousand Oaks, 2011.



COURSE SCHEME FOR B.E I YEAR-PART TIME (CBCS)
MECHANICAL ENGINEERING DEPARTMENT

Semester-I

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	AMP2C1	APPLIED MATHEMATICS-II	PC	2-1-0	3
2	APP2C2	APPLIED PHYSICS	PC	2-1-1	4
3	MEP2C3	ENGINEERING DRAWING	PC	2-1-1	4
4	COP2C4	COMPUTER PROGRAMMING IN C++	PC	2-1-1	4
5	BEP2V2	COMPREHENSIVE VIVA -II	VIRTUAL	0-0-4	4
TOTAL CREDITS					15(A)+4(V)

Semester-II

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	AMP1C1	APPLIED MATHEMATICS -I	PC	2-1-0	3
2	ACP1C2	CHEMISTRY & ENVIRONMENT SCIENCE	PC	2-1-1	4
3	MEP1C3	ELEMENTS OF MECHANICAL ENGINEERING	PC	2-1-1	4
4	ETP1C4	BASIC ELECTRONICS	PC	2-1-1	4
5	BEP1V1	COMPREHENSIVE VIVA -I	VIRTUAL	0-0-4	4
TOTAL CREDITS					15(A)+4(V)

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE I Year (Common to all branches) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
AMP2C1: Applied Mathematics-II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	1	0	2	1	0	3

Course Objectives: To introduce the mathematical concepts of Matrix Algebra, Probability, and Differential Equation for solving engineering problems that shall be used in various branches of engineering.

Prerequisite(s): Nil

COURSE OF CONTENTS

UNIT-I

Matrix Algebra: Review of Matrices; Elementary Operations on Rows and Columns; Normal Form; Linear Dependence; Rank; Application of Rank Theory in Solving System of Linear Equations; Linear Transformation; Orthogonal, Unitary and Hermitian Matrices; Characteristic Equation; Eigen- Values and Eigen-Vectors; Caley-Hamilton Theorem; Quadratic and Linear forms.

UNIT-II

First Order Ordinary Differential Equation: Exact Differential Equation; Equations Solvable for x, y and p; Clairaut's Form; Application to Simple Problems.

Higher Order Ordinary Differential Equation: Linear Differential Equations with Constant & Variable Coefficients; Method of Variation of Parameters, Simultaneous Differential Equations; Application to Simple Problems.

UNIT-III

First Order Partial Differential Equations: Formation of Partial Differential Equations; Partial Differential Equations of First Order and First Degree i.e. $Pp + Qq = R$.

Higher Order Partial Differential Equations: Linear Homogenous Partial Differential equations of n^{th} order with constant coefficients; method of Separation of variables; their Simple applications.

UNIT-IV

Probability and Statistics: Conditional Probability, Baye's Theorem; Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting, Correlation and Regression Analysis.

UNIT-V

Theory of Equations: Polynomial equations, relation between root and coefficients, symmetric functions of roots, cube roots of unity, Cardon's method for solution of cubic equations.

Fuzzy sets: Membership function, definition, Operations on Fuzzy sets, Properties of Fuzzy sets.

Learning Outcomes:

3. Apply mathematical concepts and principles to perform computations
4. Apply mathematics to solve problems
5. Create, use and analyze graphical representations of mathematical relationships
6. Communicate mathematical knowledge and understanding
7. Apply technology tools to solve problems
8. Perform abstract mathematical reasoning
9. Learn independently

BOOKS RECOMMENDED:

7. B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
8. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
9. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
10. C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
11. H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
12. Zafar Ahsan, Differential Equation and their Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
13. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons., 2000.
14. Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
15. G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
16. H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, 1996.
17. Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3rd Edition, John Wiley & Sons, Inc., 2010.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply the concept of function derivatives to study the behaviour and rate of how different quantities change, how the graph of a function can actually be computed, analysed, and predicted and use integrals to find the summation of infinitely many small factors to determine whole.
- Learn the applicability of calculus in various fields like, in physics, it is used in the study of motion, electricity, heat, light, harmonics, acoustics, astronomy, dynamics and advanced physics concepts including electromagnetism and Einstein's theory of relativity use calculus. In the field of chemistry, calculus can be used to predict functions such as reaction rates and radioactive decay. In addition, it is used to check answers for different mathematical disciplines such as statistics, analytical geometry, and algebra.
- Find a way to construct relatively simple quantitative models of change, and deduce their consequences.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) (Part Time)			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
APP2C2: Applied Physics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	1	1	2	1	1	4

Course Objectives: To introduce the fundamental concepts of physics that are useful in solving problems of engineering especially for semiconductors, optics, electromagnetism and quantum mechanics.

Prerequisite(s): nil

COURSE OF CONTENTS

UNIT-I

Optics-I: Interference of Light Waves: Thin film, Newton's Ring experiment, Michelson interferometer; Diffraction of Light Waves: Fresnel's & Fraunhofer diffraction, Zone plate, Single slit experiment, diffraction by double slit, Diffraction at Circular aperture, Plane transmission Grating.

UNIT-II

Optics-II: Polarization of Light Waves, Double refraction, Nicol Prism, Half Wave & Quarter Wave plates, Circularly & elliptically polarized light, Polarimeter; LASER: Stimulated & spontaneous emission, Population Inversion, Optical Resonator, Einstein's coefficients, He-Ne Laser, Co₂ Laser, Semiconductor Laser; Optical Fiber: types of Fibers (material, refractive index, mode), Acceptance angle, Numerical aperture, V-Number, Propagation of Light through Fibers, Applications.

UNIT-III

Crystal Structure and Semiconductors: Symmetry & properties of Simple crystal structure, Miller's Indices, Interplanar spacing, production and properties of x-ray, Bragg's law; Semiconductors: Band theory of Semiconductors, Intrinsic & extrinsic semiconductors, Fermi level, pn junction diode, LED, Zener diode, npn & pnp Transistors.

UNIT-IV

Electromagnetism: Continuity equation for Charge & Current, Inconsistency of Ampere's law for time varying field, Concept of Displacement current, Maxwell's equations; Wave equations for E & H, Propagation of one dimensional electromagnetic waves in dielectric medium, Energy density in electromagnetic field: Poynting Vector.

UNIT-V

Quantum Physics: Plank's law, Compton's effect, Concept of Matter Waves, Devison & Germer's experiment, Phase velocity & Group velocity, Heisenberg's Uncertainty Principle; Schrodinger's Wave Equation, Interpretation of Wave function Ψ , Time dependent & Time Independent equations, Schrodinger's Wave equation for a free particle in a box.

- **Learning Outcomes:**

- a working knowledge of fundamental physics and basic electrical and/or mechanical
 - engineering principles to include advanced knowledge in one or more engineering disciplines;
- the ability to identify, formulate, and solve engineering physics problems;
- the ability to apply the design process to engineering problems;
- the ability to formulate, conduct, analyze and interpret experiments in engineering physics; and
- the ability to use modern engineering physics techniques and tools, including software and laboratory instrumentation.

BOOKS RECOMMENDED:

- R K Gaur & S L Gupta, Engineering Physics, Dhanpat Rai & Sons, 2006
- H.K. Malik & A.K.Singh, Engineering Physics, Tata McGraw Hill, 2011
- N. Gupta & S.K. Tiwary , A Text Book of Engineering Physics, Dhanpat Rai & Co. 2009.
- W. T. Silfast, Laser Fundamentals Cambr. Un. Press, 1996,
- D Halliday & R Resnick, Physics Vol-II, Wiley Eastern, 1993
- H White, Modern Physics: Van Nostrand; 15/e.
- D P Khandelwal, Optics and Atomic Physics.
- R Feyaman, Feyaman Lectures on Physics, /e, Naresa Publication, 1998.
- S.O. Pilli, Solid State Physics, New Age International Publication, 2010.
- R.S. Sedha, A Text Book of Applied Electronic, S. Chand & company Lmt. 2005.
- R.P. Goyal, Unified Physics-II,,and III Shivrall Agrawal & Co. ,1994.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) (Part-Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
MEP2C3: Engineering Drawing		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		2	1	1	2	1	1	4

Course Objectives: To understand the concepts of imagining, envisioning and visualizing the objects & machine parts and drawing them with the instruments & tools.

COURSE CONTENTS

Unit-I

Introduction, need & Classification of Engineering Drawings, Drawing Instruments and their uses, Indian Standards for Drawing, Drawing Sheet Layout, Various conventions used in drawing, Technical Lettering, Dimensioning, Basic Geometrical Constructions. Engineering Scales & Engineering Curves

Unit - II

Orthographic Projections, Isometric Projections, Oblique Projections, Perspective Projections & Missing Views.

Unit - III

Projection of Points, Straight Lines and Plane Surfaces.

Unit - IV

Projection of Solids, Section of Solids & Development of Surfaces.

Unit - V

Interpenetration of Solids / Intersection of Surfaces, Introduction to Computer Aided Drawings, Drawing of Machine elements like Riveted Joints, Screw fasteners and Welded Joints.

Learning Outcomes:

- To know and understand the conventions and the method of engineering drawing. Interpret engineering drawings using fundamental technical mathematics.
- Construct basic and intermediate geometry.
- To improve their visualization skills so that they can apply these skill in developing new products.

- To improve their technical communication skill in the form of communicative drawings. Comprehend the theory of projection.

BOOKS RECOMMENDED:

- [1] Bhatt N D, *Engineering Drawing*, Charoter Publishing House, Anand, Gujrat
- [2] Agrawal B, and Agrawal C M, *Engineering Drawing*, Tata McGraw-Hill Publishing Company Limited.
- French T E, Vierck C J, Foster R J, *Engineering. Drawing and Graphic Technology* Mc Graw-Hill International, Singapore, Low Price Edition
- Luzadder W J, Duff J M, *Fundamentals of Engineering Drawing*, Prentice- Hall India, New Delhi.

- Dhananjay A Jolhe, *Engineering drawing*, Tata McGraw Hill.

- Shah M B and Rana B C , *Engineering Drawing*, Pearson Education, New Delhi.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) (Part-Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
COP2C4:		L	T	P	L	T	P	Total
Computer Programming in C++		2	1	1	2	1	1	4
Duration of Theory Paper: 3 Hours								

Course Objectives: To provide introduction to problem solving with computers using a modern language

C++, Perform object oriented programming and to demonstrate relevance of object oriented programming in developing solutions to engineering problems demonstrating usage of data abstraction, encapsulation, and inheritance, To learn exception handling techniques.

Prerequisites: Nil.

COURSE OF CONTENTS

UNIT-I

Introduction to flowcharts and problem solving. Types of programming languages, Programming with C++:- C++ Data Types:-auto, bool, int, char, float, double, void. Variables and Constants, Operators, Arithmetic and Logical Expressions, Assignment Statements and Type Casting. Control structures-Iteration statements, Jump Statements and Selective statements. Common C++ Header files, Generation of Random numbers in C++.

UNIT-II

Functions: Introduction - Call by Value and Call by Reference – return values – recursion – Arrays - Introduction to Arrays - Initialization of Array - Multi dimensional Arrays - passing arrays to functions – Strings - Arrays of Strings - Standard Library String Functions.

Structures: Structure elements, Nested Structures, Array of Structures, Array within structures and passing structures to functions.

UNIT- III

Pointers:-Declaration and Initialization of Pointers, Dynamic Memory allocation/deallocation operators:-new and delete. Pointers and Arrays:-Array of Pointers, Pointer to an array, Function returning a pointer, Reference variables and use of alias. Invoking functions by passing pointers. Files
– Introduction – File Structure - File handling functions - File Types - Error Handling.

UNIT-IV

Object Oriented Programming Paradigm - Basic Concepts of OOP - Benefits of OOP. Class and object fundamentals and various visibility modes in class, Object as function arguments-pass by value and pass by reference. Constructor:-Special Characteristics, Declaration and

Definition of a Constructor, Default Constructor, Overloaded Constructor, Copy Constructor and Constructor with default arguments.

Function Overloading:-Need and restrictions of overloaded functions, Steps involved in finding the best match, Default arguments versus overloading.

Destructor:- Special Characteristics, Declaration and Definition of a Destructor. Friend function and its characteristics and friend class.

UNIT-V

Introduction to Operator overloading - Rules for Operator overloading – overloading of binary and unary operators - Introduction to inheritance – Types of inheritance - Abstract Classes - new Operator and delete Operator - Pointers to Objects – this Pointer - Virtual Functions - Pure Virtual Functions - Introduction to Class Templates - Function Templates - Member Function Templates - Basics of Exception Handling - Types of exceptions - Exception Handling Mechanism - Throwing and Catching Mechanism - Rethrowing an Exception - Specifying Exceptions.

Learning Outcomes:

- Be exposed to basic hardware and software concepts
- Be familiar with issues related to software design
- Master using key structured programming constructs: declarations, sequence, selection, repetition, evaluating expressions.
 - Be familiar with using C++ functions and the concepts related to good modular design. Master one-dimensional and two-dimensional arrays
 - Be familiar with using C++ structures.
 - Be familiar with using pointers and reference parameters.
- Be familiar with using text file input/output
- Be familiar with C++ classes.

BOOKS RECOMMENDED:

9. Coohoon and Davidson, C++ Program Design: An introduction to Programming and Object-Oriented Design (3rd edition), Tata McGraw Hill, New Delhi, 2003.

10. Herbert Schildt, the Complete Reference, Tata McGraw Hill.

11. E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education.

12. Ravichandran, Programming With C++, Tata McGraw Hill.

13. Dromey G, How to solve it by Computer, Prentice Hall – 1978.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) (Part-Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
AMP1C1: Applied Mathematics-I	2	1	0	2	1	0	3
Duration of Theory Paper: 3 Hours							

Course Objectives: To introduce the mathematical concepts of calculus for solving engineering problems that shall be used in various branches of engineering.

Prerequisite(s): Applied Mathematics-I

COURSE OF CONTENTS

UNIT-I

Differential Calculus: Review of Successive differentiation, Leibnitz theorem and problems; Expansion of functions by Taylor's and Maclaurin's Theorem; Asymptotes; Curvature in Cartesian and Polar Coordinates; Envelopes; Evolutes and Involutives.

UNIT-II

Advanced Differential Calculus: Function of Several Variables; Partial Differentiation; Approximations and errors; Jacobians; Taylor's Series of Two Variables; Maxima and Minima of Function of Two and More Variables; Lagrange's Method of Undetermined Multipliers.

UNIT-III

Integral Calculus: Beta and Gamma functions; detailed study of tracing of curves-Cartesian, polar and parametric curves; Area; Length of Curve; Volume; Surface of Revolution; Theorems of Pappus and Guldin and problems.

UNIT-IV

Advanced Integral Calculus: Multiple integrals: Double and Triple Integration; Change of Order of Integration; Area; Volume; Centre of Gravity; Moment of Inertia.

UNIT-V

Vector Calculus: Differentiation of a Vector; Gradient; Divergence; Curl; Integration of a Vector Function; Gauss's, Green's and Stoke's Theorems.

Learning Outcomes:

- Apply mathematical concepts and principles to perform computations
- Apply mathematics to solve problems
- Create, use and analyze graphical representations of mathematical relationships
- Communicate mathematical knowledge and understanding
- Apply technology tools to solve problems
- Perform abstract mathematical reasoning
- Learn independently

BOOKS RECOMMENDED

1. B.S.Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
3. Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing
4. C.Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
5. H.K.Das, Higher Engineering Mathematics, S.Chand New Delhi.
6. E Mendelson, G J Hademenos, F Ayres, Schaum's Easy Outline: Calculus, McGraw-Hill, 2000.
7. R C Wrede, M Spiegel, Schaum's Outline of Advanced Calculus, 2/e, McGraw-Hill, 2002.

Devi Ahilya University, Indore, India				BE -I Year (Common to all branches)			
Institute of Engineering & Technology				(Part-Time)			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
ACP1C2:	L	T	P	L	T	P	Total
Applied Chemistry & Environmental Science	2	1	1	2	1	1	4
Duration of Theory Paper:							
3 Hours							

Objectives: This course is designed with two objectives: first to learn chemistry of various engineering materials, their properties, testing, structure-property relationship and their applications in various technologies. Secondly to aware with various environmental issues and pollution and control studies in modern society.

Prerequisite: Nil

COURSE OF CONTENTS

UNIT-I

Water and its applications: Sources, impurities, applications, Hardness- its expression and determination; Boiler troubles and their causes; Industrial water requirement, Treatment of water for industrial purpose; De-ionization of water; Analysis of water; Water quality parameters, Numerical problems on water analysis and water treatment processes.

UNIT-II

Engineering materials and testing: Introduction, classification and requirement of engineering materials. Material testings.

Polymers: Chemistry of polymer materials and their diversification; Types of polymerization and their brief account; Examples of polymers.

Cement, Glass and Refractories: Different types, composition, properties and uses.

UNIT-III

Lubricants: Introduction, Principle and functions of lubrication, Types of lubricants, Properties, tests and applications of solid, semi-solid and liquid lubricants; Synthetic lubricants and lubricating emulsions.

UNIT-IV I

Instrumental techniques in material characterization: Classification, Lamberts and Beers Law; Introduction, Principle and applications of Colorimetry, IR, UV-Vis, NMR and Mass

spectroscopy; Chromatographic Techniques and applications, Numerical Problems on spectroscopic techniques.

UNIT-V

Environmental science: Components of Environment and their interactions, Natural resources, Ecosystem, Impacts of development of environment, Environment protection act, EIA, Sustainable development.

Pollution and its types, Description, effects and control measures of Air, Water, Land and Noise pollution, Chemical toxicology, Global warming, Depletion of ozone layer, Acid rains, Eutrophication, Rain water harvesting, Pollution case studies.

Learning Outcomes:

1. Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries. Majors to be certified by the American Chemical Society will have extensive laboratory work and knowledge of Biological Chemistry.
2. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
3. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
4. Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
5. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
6. Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
7. Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
8. Students will be able to function as a member of an interdisciplinary problem solving team.

BOOKS RECOMMENDED:

- [1].Jain & Jain, Engineering Chemistry, Dhanpat Rai Publications, 2007.
- [2].S. S. Dara, A Text Book of Engineering Chemistry, S. Chand & Company, 2007.
- [3].B.Joseph, Environmental Studies, Tata McGraw Hill.
- [4].A.K. De, Environmental Chemistry, New Age International, 1996.
- [5].Shashi Chawala, A Text Book of Engineering Chemistry, Dhanpat Rai Publications,

Devi Ahilya University, Indore, India			BE-I Year (Common to all branches)				
Institute of Engineering & Technology			(Part-Time)				
Subject Code & Name	Instructions			Credits			
	Hours per Week						
MEP1C3:	L	T	P	L	T	P	Total
Elements of Mechanical Engineering	2	1	1	2	1	1	4
Duration of Theory Paper:							
3 Hours							

Course Objectives: To understand the basic fundamentals of Mechanical Engineering in light of thermal engineering and production engineering and to provide an insight about the basic thermal and production processes, materials, components and applications.

Prerequisites: Nil.

COURSE OF CONTENTS

UNIT I

Thermodynamics and energy, Temperature and Zeroth law of thermodynamics, Systems and control volume, Properties of a system, Energy transfer by heat and work, First law of thermodynamics, Energy analysis of closed systems, Internal energy and enthalpy of ideal gases, Energy analysis of steady flow systems, Analysis of some steady flow engineering devices, Relevant review problems.

UNIT II

Properties of pure substance, p-v and T-s diagram for a pure substance, Mollier diagram for a pure substance, Quality or dryness fraction, Steam tables, Methods for measurement of steam quality, Relevant review problems.

UNIT III

Basic considerations in the analysis of power cycles, Air standard assumptions, Overview of reciprocating engines, Thermodynamic analysis of Otto cycle: Ideal cycle for spark ignition engines, Thermodynamic analysis of Diesel cycle: Ideal cycle for compression ignition

engines, Comparison of Otto and Diesel cycles, Effect of Specific Heat and Dissociation on the performance of the cycles, Relevant review problems.

UNIT IV

Metal Casting: Classification and overview of metal casting processes: sand casting, expandable mould casting and permanent mould casting; Patterns, cores and moulding; Elements of gating systems; Heating, pouring and solidification; Casting quality: cleaning, finishing and defects.

UNIT V

Welding and Machining: Fundamentals of welding and overview of welding processes: Oxy-Acetylene gas welding, Arc welding: TIG, MIG, SAW etc., Resistance welding; Soldering & Brazing; weld quality and defects; Fundamentals of metal machining and introduction to turning and related operations; Constructional features of lathe, Geometry of single point cutting tool and cutting tool materials.

Learning Objectives:

- Understand about the working, functions and applications of equipments used in daily life
- . Identify the broad context of Mechanical engineering problems, including describing the problem conditions and identifying possible contributing factors
- Understand the fundamental elements of Mechanical engineering systems, system components and processes, with a good understanding of associated safety, quality, schedule and cost considerations.
- Employ mathematics, science, and computing techniques in a systematic, comprehensive, and Rigorous manner to support the study and solution of Mechanical engineering problems.
- Synthesize analysis results to provide constructive and creative engineering solutions that reflect social and environmental sensitivities.
- Exhibit good teamwork skills and serve as effective members of multidisciplinary project

BOOKS RECOMMENDED:

- [1]. Nag P K, Engineering Thermodynamics, The McGraw-Hill Companies, Fourth Edition.
- [2]. P N Rao, Manufacturing Technology, Vol. I and Vol.2 Tata McGraw-Hill, 4th Edition, 2014.
- [3]. Hajra & Chaudhary, Work Shop Technology, Vol. 1 & 2, 12th Edition, Media Promoters & Pub, 2007.
- [4]. Cengel Y A, Boles M A, Thermodynamics-An Engineering Approach, The McGraw-Hill Companies, Fifth Edition.
- [5]. Mikell P. Groover, Fundamentals of Modern manufacturing, 3rd Edition, John Wiley

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) (Part-Time)				
Subject Code & Name		Instructions Hours per Week		Credits				
ETP1C4: Basic Electronics		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		2	1	1	2	1	1	4

Course Objectives: To introduce the basic concepts of electronics along with the understanding of working fundamental circuit devices such as diode, transistors and opamp. **Prerequisite(s):** nil

COURSE OF CONTENTS

UNIT I

Discrete electronic devices: Diode, Zener diode, BJT (Bipolar junction transistor), LED, photodiode phototransistor, varactor; characteristic and operation (qualitative description and quantitative behavior with black box approach)

UNIT II

Diode circuits; clipper, clamper circuits, DC power supply: rectifier-half wave, full wave (center tapped, bridge), Zener regulated power supply, regulation (with regulator IC-LM317)

UNIT III

BJT characteristics; BJT biasing; CE-biasing circuits: operating point; h-parameter model of transistor; large/small signal models (concept); large/small signal models of CE-BJT amplifier, Design of amplifier; Differential amplifier (using BJT).

UNIT IV

Operational amplifier: basic model; virtual ground concept; inverting amplifier; non-inverting amplifier; integrator; differentiator; Schmitt trigger; astable multivibrator, Simple active filters: low pass, high pass, bandpass, notch filter

UNIT V

Basic feedback theory; +ve and -ve feedback; concept of stability; oscillator, Waveform generator using op-amp Schmitt trigger for Square wave, triangular wave Wien bridge oscillator for sinusoidal waveform

Learning Outcomes:

1. Students will be able to explain basic circuit concepts and responses.
2. will be able to do linear modeling of passive elements and sources.
3. will be able to use analytical techniques in resistive circuits energized by direct current voltage and current sources.

BOOKS RECOMMENDED:

- [1]. Ralph J.Smith, R.C.Dorf circuits, devices and systems, John Wiley, 1992.
- [2]. R.L.Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002.
- [3]. A. S. Sedra, K.C. Smith, Microelectronic circuits, Oxford University Press, 1998
- [4]. R.A. Gayakwad, OP-amps and linear integrated circuits, Prentice Hall of India.
- [5]. Millman, Grabel, Microelectronics, Mc-Graw-Hill.
- [6]. De Carlo, and Lin, Linear circuit analysis, Oxford University Press, 2001 (second edition).
- [7]. Hayt, Kammerly and Durbin, Engineering Circuit Analysis, Tata McGraw Hill, sixth edition.

**DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY**



FACULTY OF ENGINEERING

**SCHEME OF EXAMINATION (CBCS)
&
COURSE OF CONTENTS**

**M.Sc. (Applied Mathematics)
(Specialization in Computing & Informatics)
Batch 2015– 2016 and onwards**

DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY

Proposed Scheme for CBCS of
M.Sc. (Applied Mathematics)
with specialization in Computing and Informatics
Batch 2015– 2016 and onwards
(Subject to Revision)

SEM I				
S.No	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM1PC1	Algebra	3-1-0	Core
2.	AM1PC2	Discrete Mathematics	3-1-0	Core
3.	AM1PC3	Numerical Analysis / Integral Equations	3-1-0	Core
4.	AM1SS1	Advanced Communication Skills	2-0-0	Skill
5.	AM1GEx	Generic Elective I	3-1-0	Generic
6.	AM1PR1	Computer Lab-I (MATLAB)	0-0-2	Practical
7.	AM1CV1	Comprehensive Viva I	0-0-4	Viva
Total Credit for SEM I			20 actual + 4 Virtual credits	
		List of Generic Elective I		
1.	AM1GE1	Computer Architecture/ Digital Electronics and Computer Organization	3-1-0	
2.	AM1GE2	Advanced Special Functions	3-1-0	
3.	AM1GE3	Financial Accounts	3-1-0	

SEM II				
S.No	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM2PC1	Real Analysis / Measure Theory	3-1-0	Core
2.	AM2PC2	Advanced Differential Equations	3-1-0	Core
3.	AM2PC3	Theory of Computation	3-1-0	Core
4.	AM2ECx	Discipline Elective I	3-0-0	Disc. Elec.
5.	AM2EMx	Discipline Elective II	3-0-0	Disc. Elec.
6.	AM2PR2	Computer Lab-II (Of Subject of Discipline Elective -I)	0-0-2	Practical
7.	AM2CV2	Comprehensive Viva II	0-0-4	Viva
Total Credit for SEM II			20 actual + 4 Virtual credits	
		List of Discipline Elective I		
1.	AM2EC1	Object Oriented Programming with Core Java	3-0-0	
2.	AM2EC2	Comp. Graphics /Multimedia	3-0-0	

		List of Discipline Elective II		
1.	AM2EM1	Operations Research-I	3-0-0	
2.	AM2EM2	Soft Computing Techniques	3-0-0	

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DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY
Proposed Scheme for CBCS of
M.Sc. (Applied Mathematics)

SEM I

S.No	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM1PC1	Algebra	3-1-0	Core
2.	AM1PC2	Discrete Mathematics	3-1-0	Core
3.	AM1PC3	Numerical Analysis / Integral Equations	3-1-0	Core
4.	AM1SS1	Advanced Communication Skills	2-0-0	Skill
5.	AM1GEx	Generic Elective I	3-1-0	Generic
6.	AM1PR1	Computer Lab-I (MATLAB)	0-0-2	Practical
7.	AM1CV1	Comprehensive Viva I	0-0-4	Viva
Total Credit for SEM I			20 actual + 4 Virtual credits	
		List of Generic Elective I		
1.	AM1GE1	Computer Architecture/ Digital Electronics and Computer Organization	3-1-0	
2.	AM1GE2	Advanced Special Functions	3-1-0	
3.	AM1GE3	Financial Accounts	3-1-0	

SEM II

S.No	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM2PC1	Real Analysis / Measure Theory	3-1-0	Core
2.	AM2PC2	Advanced Differential Equations	3-1-0	Core
3.	AM2PC3	Theory of Computation	3-1-0	Core
4.	AM2ECx	Discipline Elective I	3-0-0	Disc. Elec.
5.	AM2EMx	Discipline Elective II	3-0-0	Disc. Elec.
6.	AM2PR2	Computer Lab-II (Of Subject of Discipline Elective -I)	0-0-2	Practical
7.	AM2CV2	Comprehensive Viva II	0-0-4	Viva
Total Credit for SEM II			20 actual + 4 Virtual credits	
		List of Discipline Elective I		
1.	AM2EC1	Object Oriented Programming with Core Java	3-0-0	
2.	AM2EC2	Comp. Graphics /Multimedia	3-0-0	
		List of Discipline Elective II		
1.	AM2EM1	Operations Research-I	3-0-0	
2.	AM2EM2	Soft Computing Techniques	3-0-0	

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (<u>Applied Mathematics</u>) with Specialization in Computing & Informatics Semester- I				
Subject Code & Name	Instructions			Credits			
	Hours per Week			L	T	P	Total
AM1PC1: Algebra	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The philosophy of this course is that modern algebraic notions play a fundamental role in mathematics itself and in applications to areas such as physics, computer science, economics and engineering.
- To study the abstractions such as groups, rings, fields, vector space and linear transformations.
- To introduce the notion of an axiomatic system through the example of group theory, investigate elementary properties of groups and examples, such as general linear groups and symmetric groups; Use a combination of theoretical knowledge and independent mathematical thinking to investigate questions in ring theory and to construct proofs; Linear algebra - unitary matrices, Hermitian matrices, canonical forms; Special rings like: integral domains and polynomial rings and factorizations of elements there in; fundamentals of field theory.

Prerequisites: Knowledge of basics of functions, limits, derivatives, and integrals.

COURSE OF CONTENTS

UNIT I

Preview of Groups, subgroups, cosets, Lagrange's theorem, normal subgroups, quotient groups, homomorphism, isomorphism theorems, Cayley's theorem and Permutation groups. Conjugacy, Sylow theorems, Direct products, Structure theorem for finite abelian groups, Normal and Subnormal series, composition series, Jordan holder theorem, Solvable and Nilpotent groups.

UNIT II

Rings, Integral domains, Ideals, Prime ideals, Maximal ideals, homomorphisms, Quotient rings, Fields, characteristic of an integral domain, Prime fields. Euclidean domains, Unique factorization domains, Principal ideal domain, Polynomial rings, Unique factorization in polynomial rings, Eisenstein's criterion of Irreducibility, Noetherian and Artinian rings.

UNIT III

Review of Basic Concepts of Vector space, Bases, Dimension, Nullity theorem and Rank of a matrix. Linear transformation, Quotient space, Direct sums, dimension of a direct sum, Characteristic polynomials, theorems on Eigen values & Eigen vectors, Cayley- Hamiltonian theorem, Jordan form, Diagonalization, Dual space, Annihilators.

UNIT IV

Modules, Sub modules, Direct Sum, Homomorphism and Isomorphism theorems, Quotient modules, Cyclic modules, simple modules, Free modules, Schur's lemma.

UNIT V

Finite Field Extension, algebraic and transcendental extension, splitting fields, separable and inseparable extension, perfect field, normal extensions, Galois group, solvability by radicals.

Learning Outcomes:

Upon completing the course, students will be able to:

- Develop critical thinking skills, including problem solving, logic, patterns, and deductive and inductive reasoning.
- Explain the fundamental concepts of advanced algebra such as groups and rings and their role in modern mathematics and applied contexts
- Apply problem-solving using advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematical contexts.

BOOKS RECOMMENDED:

1. I.N. Herstein, Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. Fraleigh J.B, A First Course in Abstract Algebra, Seventh Edition, Pearson Education, 2002.
3. S.Kumaresan, Linear Algebra, A Geometric Approach, Prentice - Hall of India, 2000.
4. S. Lang, Linear Algebra, Undergraduate Texts in Mathematics, Springer-Verlag, New York, 1989.
5. A.R. Vasishtha, Modern Algebra, Prakashan Media Ltd, Meerut, India, 2002
6. Artin Michael , Algebra , Pearson Education Inc. , 2007 .

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- I				
Subject Code & Name		Instructions Hours per Week			Credits			
AM1PC2: Discrete Mathematics		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	-	3	1	-	4

Learning Objectives:

- To provide the fundamentals of formal techniques for solve the problems in computational domain and algorithm development.
- Identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, binary relations, graphs and trees; to solve counting problems by applying elementary counting techniques; to use and analyse recursive definitions;

Prerequisites: NIL

COURSE OF CONTENTS

UNIT I

Set Theory: Operation and Algebra; Principle of Inclusion and Exclusion; Computer Representation.

Proposition Logic: Logic Connectives; Truth Tables; Propositional equivalences, predicates, Quantifiers, Method of Proof.

Mathematical induction: Strong induction; Well-ordering; Recursive definitions, Structural Induction.

UNIT II

Counting Techniques: Law of Product and Sum; Permutation, Combination, Pigeon Hole Principle; Tree Diagram. **Function:** Types of Functions; Hashing.

Application of Group theory: Group Coding.

UNIT III

Relations: Binary Relation and Properties; n-ary relation and their applications to Databases, Closures of relations; Equivalence, Partial ordered and Compatible relations, Lattices.

Boolean algebra: Gate Algebra; Logic Algebra; Switching Algebra.

UNIT IV

Graph Theory: Terminology; Graph Representation; Graph isomorphism; Connectedness; Euler and Hamilton Graphs; Shortest Paths, Planar graphs, Euler's formula, Kuratowski's theorem. Graph colouring, chromatic number, **Trees:** Terminology; Tree Traversals; Prefix Codes; Spanning Trees.

UNIT V

Overview of the topics: Automata & Grammar; Analysis of algorithms; Fuzzy logic.

Recurrence Relations: Solution of Homogeneous and non-homogeneous recurrence relation with constant coefficients using Boole's operator method, method of undetermined coefficients and generating functions. Simultaneous recurrence relation.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
- Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
- Be able to use effectively algebraic techniques to analyze basic discrete structures and algorithms.
- Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.
- Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
- Use finite-state machines to model computer operations and apply fuzzy logic and reasoning to handle uncertainty.

BOOKS RECOMMENDED:

- Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Edition 2007.
- Kolman, Busby & Ross, Discrete Mathematical Structures, 6th edition, Pearson Education, 2008.
- C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
- Trembley and Manohar, Discrete Mathematical structures for Computer Science, McGraw Hill, 1986.
- Narsingh Deo, Graph Theory with Applications to Engineering. & Computer Science, 4th ed., Prentice Hall of India, 2004.
- K. A. Ross and C. R. B. Wright, Discrete Mathematics (Fifth Edition), Prentice Hall, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- 1			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM1PC3:	L	T	P	L	T	P	Total
Numerical Analysis/Integral Equations	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize the students about different numerical techniques e.g. solving algebraic and transcendental equations, large linear system of equations, differential equations, approximating functions by polynomials upto a given desired accuracy, finding approximate value of definite integrals of functions etc.
- Also throws light on the convergence analysis of these techniques and explains different types of errors which gets involved and propagates during numerical computations.
- To impart analytical ability in solving Integral equation, which are important in many applications such as radiative energy transfer and the oscillation of a string, membrane, or axle.

Prerequisite(s): NIL

COURSE OF CONTENTS

UNIT I

Errors and Approximation: Representation of integers and fractions, fixed point and floating point arithmetic, error propagation, loss of significance, condition and instability, computational method of error propagation. Solution of Nonlinear Equations: Iterative methods of 2nd degree, convergence of methods, polynomial equations, convergence acceleration.

UNIT II

Solution of Linear Systems: Elimination with and without pivoting, triangular factorization, error and residual of an approximate solution. Backward errors and iterative improvement, relaxation method. Polynomial Interpolation: Existence and uniqueness of interpolation polynomial, error of the interpolating polynomial, Finite difference operators, Interpolation using differences, spline interpolation, piecewise interpolation, approximations.

UNIT III

Numerical differentiation, Extrapolation methods, Numerical Integration: Newton Cote's integration methods, Gaussian integration methods, composite integration methods, Romberg Integration, double integration. Solution of ODEs: Initial and boundary value problems, difference equations, Routh Hurwitz criterion, single step method, Multistep method, Predictor-Corrector methods, Stability analysis, Shooting methods and finite difference methods.

UNIT IV

Integral Equations: Preliminary concepts, formulation of integral equations, and classification of linear integral equations. Integral differential equations, conversions of ordinary differential equations to integral equations, finite difference approximations. Volterra Integral Equations: Basic concepts - Relationship between Linear differential equations and Volterra integral equations - Resolvent Kernel of Volterra Integral equation - Solution of Integral equations by Resolvent Kernel - The Method of successive approximations - Convolution type equations.

UNIT V

Fredholm Integral equations: Fredholm equations of the second kind, Fundamentals – Iterated Kernels, Constructing the resolvent Kernel with the aid of iterated Kernels - Integral equations with degenerate Kernels - Characteristic numbers and eigen functions, solution of homogeneous integral equations with degenerate Kernel - nonhomogeneous symmetric equations - Fredholm alternative.

Learning Outcomes:

On completion of this course students should be able to:

- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyze and evaluate the accuracy of common numerical methods.
- Establish the relationship between integral equations and ordinary differential equations and how to solve the linear and non-linear integral equations by different methods with some problems which give rise to Integral Equations.

BOOKS RECOMMENDED:

- [1] Conte S.D. and deBoor C., Elementary Numerical Analysis - An Algorithmic Approach; 3rd edn., McGraw Hill, 1981.
- [2] Froberg C.E., Numerical Mathematics - Theory and Computer Applications; Benjamin Cummings Pub. Co., 1985.
- [3] Computer Oriented Numerical Methods: Raja Raman V., Prentice Hall 1988.
- [4] B.P. Parashar, Differential and Integral equations, CBS Publishers and Dist., New Delhi, 1998.
- [5] Jain N.K., Iyengar, S.R.K. and Jain R.K., Numerical methods for scientific and Engineering Computations, Wile Eastern Ltd., 1984.
- [6] Ram P Kanwal, Linear Integral Equations, Academic Press, 2nd Ed., 1996.
- [7] S.S. Sastry, Introductory methods of Numerical Analysis, 3rd ed., Prentice Hall of India, 1998.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics				
			Semester- I				
Subject Code & Name	Instructions Hours per Week			Credits			
AMISS1 Advanced Communication Skill	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	-	-	2	-	-	2

Learning Objectives:

- To make student aware of how they can make their communication strong by understanding the various parts of communication. To strengthen verbal communication and how various components of nonverbal communication can be used, is one of the major learning objective.
- To inculcate right way of discussion to bring out maximum output.

Prerequisites: Nil

COURSE OF CONTENTS

UNIT I

Fundamentals of Communication: Definitions, importance, forms of communication, process of communication, various channels of communication, barriers for effective communication & ways to overcome them. Listening and its importance: Definition, barriers for effective listening, improving listening abilities, exercises and cases

UNIT II

Communication skills: Importance of communication, Art of communicating, Elements of interpersonal communication, Verbal Communication, Non-verbal Communication, Body Language, exercises and cases.

UNIT III

Group Discussions: Definition, importance, process, effectively participating in Group Discussions, Dos and Don'ts, Practicing by mock Group Discussions.

Interviews: Types of Interview, Role of Interviewee and Role of Interviewer, Commonly asked questions in an interview, Dos and Don'ts in an interview, Practicing by mock interviews.

UNIT IV

Transactional Analysis: Johari Window, FIRO-B, FIRO-B Self-exercise workshop.
Written communication: Report writing, Documentation, Business Correspondence, Preparation of manuals and Project Reports, E-mails, Types of e-mails, e-mail protocol.

UNIT V

Negotiation skills: Need, Definition, Process of negotiation, various stages of negotiation, Essentials of effective negotiation, Strategies of negotiation.

Learning Outcomes:

Upon completing the course, students will be able to-

- Recognize various personality traits and apply them in their day to day life.
- Make their communication precise and correct.
- Understand various negotiation techniques which they can use in real world.
- To understand the right way of presenting their view and thoughts.

BOOKS RECOMMENDED:

[1] P.D. Chaturvedi, Mukesh Chaturvedi , Business Communication, Pearson Education, Singapore Pvt. Ltd. 2008.

[2] K.K. Sinha, Business Communication, 2nd Ed., Galgotia Publishing Company, 2001.

[3] R.C. Sharma, Krishna Mohan, Business Correspondence and Report Writing, 3rd Ed., Tata McGraw Hill, 2002.

[4] Scot Ober, Contemporary Business Communication, 5th Ed., Biztantra, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics				
			Semester- I				
Subject Code & Name	Instructions Hours per Week			Credits			
AM1GE1 Computer Architecture/ Digital Electronics & Computer Organization	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objective:

- Aim of this course is to aware students about the hardware of computers, get acquainted with different number systems, their Inter-conversion and operations.
- Familiarized with different logic families & relative performance.
- Ability to design various combinational circuits by solving & reducing Boolean equations.
- Familiarize with the internal working of modern computer systems.

Prerequisite(s): Computer Programming.

COURSE OF CONTENTS

UNIT-I

Introduction to Computer Architecture, Memory Organization and Control Design Introduction, CPU Organization, Instruction Sets, Memory Technology, Memory system, Caches, Basic concepts of control design, micro programmed Control and Pipeline Control.

UNIT II

Binary Systems: Digital Systems, Binary Numbers, Binary Codes, Error detecting Code. Computer Arithmetic Number Base Conversions, Octal and Hexadecimal – conversions. Boolean Algebra and Logic Gates, Functions Minterms and Maxterms – Laws and theorems of Boolean Algebra – Demorgan’s theorems – The Universal Building blocks – NAND & NOR gates as universal Building Blocks.

UNIT III

Simplification of Boolean Expressions : Canonical SOP and POS forms – Algebraic Simplification – Karnaugh Maps – SOP & POS Simplification – NAND / NOR implementation of Boolean expressions – Don’t care, conditions – Overlapping groups, eliminating redundant groups. Combinational Logic circuits : Half and Full Adders – Half and Full subtractors – BCD adder – parallel binary adder – Multiplexer & Demultiplexer – Encoder & Decoder.

UNIT IV

Sequential Logic circuits: NAND latch – SR, flipflop – JK flipflop – Edge triggering – PRESET and CLEAR inputs, Shift Register, Universal Shift register – Asynchronous and Synchronous counters – BCD counter.

UNIT V

Parallel Computer Models: Introduction - Flynn's Classifications - Parallel & Vector Computer System - Attributes to performance - implicit and explicit parallelism - shared memory – multiprocessors – Uniform and Non-Uniform Memory Access and Cache only Memory Access Models – Distributed Memory Multicomputers – Multivector & SIMD Computers – PRAM and VLSI Module.

Learning Outcomes:

By the end of this course, student should be able to:

- Be familiar with history of modern computer.
- Describe the various architectural concepts that may be applied to optimize and enhance the classical Von Neumann architecture into high performance computing hardware systems.
- Be familiar with the basic knowledge of the design, digital logic circuit and apply computer organization.
- Understand how computer represent and manipulate data.

BOOKS RECOMMENDED:

- [1] John P. Hayes, Computer Architecture and Organization, McGraw Hill, 3rd Ed.,
- [2] Kai Hwang, Advanced Computer Architecture, McGraw Hill, 1993.
- [3] Stallings W., Computer Organization and Architecture, Designing for
- [4] Meena K, Principles of Digital Electronics, PHI Learning Pvt. Ltd., 2009
- [5] Thomas Bartee C, Digital Computer Fundamentals, TMH, 6th Edition, 1995.
- [6] Moris Mano, Computer Architecture and Logic Design, TMH Publications, ND,
- [7] Nicholas Carter, Computer Architecture Schaum Series Adaptation, 2nd edition,

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (<u>Applied Mathematics</u>) with Specialization in Computing & <u>Informatics</u> Semester- I					
Subject Code & Name	Instructions			Credits				
	Hours per Week							
AM1GE2 Advanced Functions	Special	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	-	3	1	-	4

Learning Objectives:

- To study mathematical functions which are useful in mathematical analysis, physics, engineering fields and so on.
- Deal with Bessel, Hermite, Legendre differential equations and so on along with the corresponding recurrence formulas, orthogonal polynomials etc. of different functions.

Prerequisites: Nil.

COURSE OF CONTENTS

UNIT I

Orthogonal polynomials: Simple set, orthogonal set, orthogonal polynomials, zeros of orthogonal polynomials.

The Gamma and Beta functions: Gamma function, Euler or Mascheroni constant γ , 1. series for $\Gamma'(z) / \Gamma(z)$, the Euler product for $\Gamma(z)$, Beta function, the value of $\Gamma(z)$ $\Gamma(1-z)$, Factorial function, Gauss multiplication theorem, Legendre's duplication formula.

UNIT II

The Hyper geometric functions: A simple integral form, evaluation of $F(a, b, c, l)$, the contiguous function relations, the hyper geometric differential equations, simple transformations.

Generalized Hyper geometric functions: The function ${}_pF_q$, Saalschutz's theorem, Whipple's theorem, Dixon's theorem, Confluent Hyper geometric function, basic properties of ${}_1F_1$, Kummer's theorems, Ramanujan's theorem.

UNIT III

Bessel's functions: Definition of $J_n(x)$, generating function, Bessel's differential equation, recurrence relations, Bessel's integral.

Legendre's Polynomial: Generating functions for Legendre's polynomials, recurrence relation, Rodrigues formula, Murphy's formula, hyper geometric forms of $P_n(x)$, Bateman's generating function, Laplace's first integral form, orthogonality.

Hermite polynomials: Hermite differential equation, definition of Hermite polynomials $H_n(x)$, generating functions, Rodrigue's formula, recurrence relation, orthogonality, expansion of polynomials, more generating functions. **Laguerre Polynomials:** Laguerre polynomials $L_n(x)$, generating functions, Rodrigue's formula, recurrence relations, orthogonality, expansion of polynomials.

UNIT V

Chebyshev polynomial: Independent solution of Chebyshev's equation, generating function, recurrence relations, orthogonal properties.

Jacobi polynomial: Jacobi polynomials, Batemans generating function, Rodrigues formula, orthogonal properties.

Learning Outcomes:

Upon completing the course, students will be able to:

- To apply Special functions and their application in areas of Mathematics, Science and industry. Carry basic research in the field of Special Functions.
- Apply them in the fields of mechanics, wave propagation and scattering, fiber optics, heat conduction in solids, and vibration phenomena.

BOOKS RECOMMENDED:

[1] Rainville, E.D., Special functions, the Macmillan Co., New York 1971.

[2] Saran, N., Sharma S.D., Trivedi T.N., Special Functions, Pragati Prakashan, 1982.

[3] Labder N.N., Special functions and their applications, Prentice Hall, New Jersey, .

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- I				
Subject Code & Name	Instructions Hours per Week			Credits			
AMIGE3 Financial Accounting	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To give an in-depth knowledge of all business mathematics and how they should be recorded, classified & interpreted to get a meaningful judgment of viability & profitability of the business.
- The course is designed to make students be able to prepare a set of financial statements for various forms of businesses and nonprofit entities, develop an ability to apply accounting concepts, principles and practices and be familiar with the basic tools for analyses of financial statements.

Prerequisite(s): Students must be aware about the basic quantitative mathematics.

COURSE OF CONTENTS

UNIT I

Introduction and purpose of accounting, uses of accounting information & basic accounting concepts. Accounting Structure: Process of accounting, Journal, Ledger & Trial balance, based on double entry book keeping.

UNIT II

Practical system of accounting: Cash book, sales & purchase of goods, Bill of exchange bank reconciliation statements.

UNIT III

Preparation of Financial Statements: Income statements, (Profit and Loss A/C), Statement of financial Position (Balance Sheet) and Adjustments, valuation of Assets and Depreciation methods (SLR & WDV). Cash and fund flow, Analysis of financial statements- Financial Ratio.

UNIT IV

Introduction to cost accounting: Elements of cost, Cost determination, Direct and Indirect cost, Cost centers & cost units, the behavior of cost.

UNIT V

Break Even Analysis: Leverages: operating, financial and combined. Inventory Management and Responsibility Accounting: Methods of Inventory Management and

Material Issues. Responsibility Accounting Meaning, Preparation of Cost Sheet, Preparation of Tender, Production Accounts.

Learning Outcomes:

- Upon completing the course, students will be able to:
- The student will experience real-world learning and application of skills via their internship.
- Recognize and understand ethical issues related to the accounting profession.
- Prepare financial statements in accordance with Generally Accepted Accounting Principles.
- Employ critical thinking skills to analyze financial data as well as the effects of differing financial accounting methods on the financial statements.
- Effectively define the needs of the various users of accounting data and demonstrate the ability to communicate such data effectively, as well as the ability to provide knowledgeable recommendations.
- Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures.
- Apply cost accounting methods to evaluate and project business performance.
- Apply appropriate judgment derived from knowledge of accounting theory, to financial analysis and decision making.
- The subject will develop through concepts of accounting and cost accounting that will help them acquire the ability to develop and use the accounting data as an aid to decision making, work successfully on any project in the corporate.

BOOKS RECOMMENDED:

- T S Grewal & S C Gupta, Introduction to Accountancy, S. Chand & Co. Ltd., 2014.
- Robert Anthony & James S. Reece, Accounting Principles, Richard d Irwin, 1988.
- M.Y. Khan & P. K Jain, Financial Management, McGraw Hill Education; Seventh edition, 2017.
- S.N. Maheshwari & S.N. Mittal, Cost Accounting, Mahavir Publications; 26th Edition, 2015.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM2PC1: Real Analysis/ Measure Theory	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To study the analytic properties of real functions and sequences, including convergence and limits of sequences of real numbers, the calculus of the real numbers.
- Study measures whose main applications are in the foundations of the Lebesgue integral.

Prerequisites: Knowledge of Set theory, algebra of functions and sequence & series of Real and Complex numbers.

COURSE OF CONTENTS

UNIT I

The Riemann-Stieltjes Integral, Definition and existence of the integral, properties of the integral, integration and differentiation, integration of vector-valued functions, rectifiable curves.

UNIT II

Rearrangements of terms of a series, Riemann theorem, Sequences and Series of Functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, uniform convergence and continuity, uniform convergence and integration, Uniform convergence and differentiation, equicontinuous families of functions, the Stone-Weierstrass Theorem, uniform convergence and Riemann-Stieltjes integral, Abels test for uniform convergence, Dirichlet's test for uniform convergence, power series, Abel's theorem.

UNIT III

Lebesgue outer measure, Measurable sets, Measurable functions, Borel and Lebesgue measurability, non measurable sets, Littlewoods three principles, non Borel measurable set, Lebesgue integral of a bounded function over a set of finite measure, the integral of a nonnegative function, the general Lebesgue integral.

UNIT IV

Measure space, Measurable functions, Integration, General convergence theorems, signed measure, product measure, inner measure.

UNIT V

L^p spaces, convex functions, Jensen's Inequality, Minkowski and Holder inequalities, convergence and completeness of L^p , approximations in L^p .

Learning Outcomes:

Upon completing the course, students will be able to:

- [6] Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- [7] Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.
- [8] The course provides the basis for further studies within functional analysis, topology and complex analysis.

BOOKS RECOMMENDED:

- [1] Halsey Royden, Real Analysis, Prentice Hall of India, New Delhi, 3rd Edition,
- [2] Walter Rudin, Principles of Mathematical Analysis, McGraw-Hill Publishin.
- [3] R. G. Bartle and D.R. Sherbert, Introduction to Real analysis, 3rd Ed., 2000.
- [4] H. K. Pathak, Real Analysis, Shiksha Sahitya Prakashan, Meerut, 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM2PC2: Advanced	L	T	P	L	T	P	Total
Differential Equations	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce students to the methods of ordinary and partial differential equations. Ordinary and partial differential equations form an essential part of the mathematical background required for modelling a large number of real-life problems. The course concentrates on some fundamental analytical methods for applied differential equations arising from the mathematical modelling of physical, chemical and biological systems.

Prerequisite(s): Basic knowledge of differentiation and integration.

COURSE OF CONTENTS

UNIT I

Existence of solution, uniqueness of solution, method of successive approximation, system of differential equation, dependence of solution on initial condition and parameters, maximum and minimum solution, variation of solutions.

UNIT II

Exact Linear Differential Equations of nth order – condition of exactness for a linear equation of order n. Integrating factors. Non-linear differential equation of particular forms-exact non-linear differential equations. Riccati's Equation, Homogeneous equations.

UNIT III

Series Solutions of second order Linear Differential Equations, Method of Frobenius, Total differential Equation- Necessary & Sufficient condition for the total Differential Equations, Solution of a Total Equation involving four variables.

UNIT IV

Partial Differential equations of first order – formulation and Classification of partial differential equations, Lagrange's linear equation, Particular forms of non-linear partial differential equations, Charpit's method.

Linear partial differential equations with constant coefficients. Homogeneous equations, Non homogeneous equation.

UNIT V

Partial differential equations of second order with variable coefficients, Monge's Methods, Separation of variables, canonical forms, Elliptic, Parabolic and Hyperbolic differential equations, Green's Functions.

Learning Outcomes:

On successful completion of the course students will be able to:

- Have a broad overview of ordinary and partial differential equations as well as an appreciation of the application of analysis and linear algebra in studying differential equations.
- Apply an appropriate method for the solution of linear and non-linear ordinary/partial differential equations

BOOKS RECOMMENDED:

- [1] Rai Singhania, Advanced Differential Equations & Integral Transform.
- [2] Zafar Ahsan, Differential Equations and their Application, Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.
- [3] Sankara Rao, K., Introduction to Partial Differential Equations, Prentice Hall of India Pvt. Ltd., New Delhi 1997.
- [4] Earl A. Coddington, An Introduction to ordinary Differential Equations, Tata McGraw Hill, 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II				
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM2PC3: Theory of Computation	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To familiarize students about theoretical and mathematical aspects of computer science.
- Be exposed to a broad overview of the theoretical foundations of computer science.

Prerequisite: Basics of Discrete Maths.

COURSE OF CONTENTS

UNIT I

Automata Theory: Introduction to Finite Automata, Structural Representations, Automata and Complexity, Central Concepts to Automata Theory, Finite Automata: An Informal Picture of FA, DFA, NFA, Equivalence of NFA and DFA, FA with ϵ -transitions: Eliminating ϵ -transitions-Conversion of NFA with ϵ to NFA without ϵ , Conversion of NFA without ϵ to DFA, Conversion of NFA to DFA (direct method), Moore and Mealy machines.

UNIT II

Regular Expressions (RE) and Languages: Regular Expressions – Operators of RE, Building RE, Precedence of operators, Algebraic laws for RE, Arden’s Theorem, FA and RE: DFA to RE, RE to DFA (RE to s-NFA & e-NFA to DFA and RE to DFA-direct method), FA limitations, Properties of Regular Languages: pumping lemma for regular languages, closure and decision properties of regular languages, Equivalence and minimization of automata, Lexical analysis and finding patterns in text

UNIT III

Context Free Grammars (CFG) and Languages: Context Free Grammar-Definition, derivations, languages of a grammar, sentential form, Parse Tree, Ambiguity in grammars and languages, Properties of CFL- Normal forms- Chomsky Normal Form and Greibach Normal Form, Eliminating unit productions, useless production, useless symbols, and ϵ -productions, Regular Grammar and Finite Automata, FA to RG and RG to FA, Inter-conversion between left linear and right linear regular grammar

UNIT IV

Push Down Automata (PDA): The Language of PDA, CFG to PDA, PDA to CFG, Deterministic Push Down Automata - Regular language and DPDA, DPDA and CFL, DPDA and ambiguous grammar, Non-deterministic Push Down Automata, The pumping lemma for CFL, Closure properties of CFL, Chomsky Hierarchy.

Turing Machine: Notation, the language of TM, TM and Halting, Programming techniques to TM, Extensions to basic TM, Comparison between FA, PDA.

UNIT V

Petri nets and its Applications; Programming Language Semantics; Verification of Programs; Formal and Type Systems; Computational Complexity. Complexity of Computing using HLL programs and Automata models; Formal Semantics of programming Languages; Verification of Programs.

Learning Outcomes:

By the end of this course, student should be able to

- Apply knowledge of computing and mathematics appropriate to the discipline.
- Be familiar with thinking analytically and intuitively for problem-solving situations in related areas of theory in computer science.
- Apply knowledge of context-free languages, grammar, finite automata, push down automata, and Turing recognizable languages.

BOOKS RECOMMENDED:

[1] Cohen, Introduction to Computer Theory, John Wiley, 1990.

[2] P Linz, An Introduction to Formal languages and Automata, 3/e, Narosa Pub. 2003.

[3] J. Martin, Introduction to Languages and the Theory of Computation, 3/e, Tata McGraw Hill, 2005.

[4] J.Hopcroft and J.D. Ullman, Introduction to Languages, Automata and Computation, Addison Wesley, 1981.

[5] K L P Mishra and N Chandraskran, Theory of Computer Science, PHI Learning Pvt. Ltd., 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II				
Subject Code & Name		Instructions			Credits			
		Hours per Week						
AM2EC1:	Object	L	T	P	L	T	P	Total
	Oriented Programming with Core Java	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

- To learn Object-Oriented programming concepts and techniques using the Java programming language.
- To learn to write, test, and debug introductory level Object-Oriented programs using Java.
- Introduce to the following concepts, which are important workforce activities like: Design/Develop Program, Implement Program, Write code, perform unit testing, Integrate subsystems, Resolve defects and revise and adapt existing code, Test and Validate Program, develop test procedures, perform tests.

Prerequisite: Basic knowledge about computers, test editors etc.

COURSE OF CONTENTS

UNIT-I

Introduction to Java: Features of Java, Object-oriented programming overview, Introduction of Java Technologies, How to write simple Java programs, Data Types, Variables, Memory concepts, decision making operators, Naming Conventions. . Type conversion & casting, Operators, Control Statements, break and continue Statements. Static Method, static field and Math Class, Argument Promotion and Casting,

UNIT-II

Introduction to Java classes and objects: Introduction to Class, Objects, Methods and Instance Variables, Primitive type Vs Reference Type, Initializing Objects with Constructors Scope of declaration and Method Overloading.

String Handling: The String constructors, String operators, Character Exaction, String comparison, String Buffer.

Arrays: Enhanced for Statement, Passing Arrays to Method, Multidimensional Arrays, Variable-Length Argument lists, Using Command-line Arguments. final Instance Variables, this reference, static import, overloaded Constructors, Garbage collection and method finalize, Overloading methods, Parameter passing.

UNIT-III

Inheritance: Relationship between Superclasses and Subclasses, Using super, Constructor in Subclasses, The Object Class, Object Copying in Java. **Polymorphism:** Method overriding, upcasting, Dynamic Method Dispatch, final Method and classes, Abstract classes and Methods, instance of operator, Downcasting, Class class, Runtime type Identification

Packages: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages.

Interfaces Defining an Interface, Properties of interface, advantages of interface achieving multiple inheritance through interfaces, Variables in Interfaces, Comparable interface.

UNIT IV

Exception Handling: Introduction, overview of doing it and keywords used, when to use it, JavaException Hierarchy, finally block, chained exceptions, declaring new exception types, preconditions and postconditions.

Multithreading: What are threads, The java thread model, Thread priorities, Thread life cycle, Creating thread and executing thread, Thread Synchronization, producer-consumer problem without Synchronization, Producer-consumer problem with Synchronization, Other class and Interfaces in java.util. concurrent, Monitor and Monitor Locks, Thread Groups, Synchronization, Inter-thread Communication.

UNIT V

Streams and Files: Introduction, Data Hierarchy, Files and Streams, Sequential-access Text Files, Object Serialization, Random-Access files, Java Stream class Hierarchy.

Introduction To GUI: Introduction, Overview of swing Components, Introduction to Event Handling, Common GUI Event Type and Listener Interfaces, How Event Handling Works, Adapter Classes, Layout Managers.

Applets: Applet basics, Applet Architecture, Applet life cycle methods, Applet HTML Tag and attributes, executing applet in web browser and in the appletviewer.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply Object-Oriented programming concepts and techniques using the Java programming language.
- Write, test, and debug introductory level Object-Oriented programs using Java.

BOOKS RECOMMENDED:

- [1] Cay S.Horstmann, Core JAVA Vol-1, Pearson Education, 8th Ed., 2008.
- [2] Herbert Schildt, Java: The Complete Reference 7th Edition, Tata McGraw Hill, 2006.
- [3] Scott W Amber, The Object Primer, 2nd Ed., Cambridge, 2001.
- [4] Timothy, Budd, Object Oriented Programming, Pearson Education, 2001.
- [5] Kathy Sierra, Bert Bates, Head First Java, 2nd Edition, Oreilly , 2005.
- [6] Balagurwamy, Programming with Java, 3rd Ed., Tata McGraw-Hill Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II				
Subject Code & Name		Instructions			Credits			
		Hours per Week						
AM2EC2:	Comp.	L	T	P	L	T	P	Total
Graphics / Multimedia		3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

The objectives of the course are to:

1. Understand the need of developing graphics applications.
2. Learn the hardware involved in building graphics applications.
3. Learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.
4. Learn the representation and transformation of graphical images and pictures.
5. Learn the concept of Colour Generation.

Prerequisite(s): C/C++ programming, Solid high school mathematics: Vectors, Matrices, Basic linear algebra such as solving a system of linear equations, Polynomials, Elementary signal processing (Fourier transform and filtering).

COURSE OF CONTENTS

UNIT I

Introduction to Computer Graphics, Application of Graphics, Display Devices: Refresh Cathode -Ray Tubes, Raster Scan Displays, Random Scan Displays, Color CRT Monitors, Flat Panel Displays. Video cards/display cards Input Devices: Mouse, Trackball, Space ball, Data Glove, Joystick, Light pen, Scanner, Digital Camera, Touch Panels, Voice Systems. Hardcopy Devices: Printers and Plotters

UNIT II

Creation of two dimensional objects and applying simple transformations like Translation, Scaling, Rotation and applying Composite transformations. Graphics Primitives Algorithms for line, polygon and circle. Creation of simple three dimensional objects like cube, cone and cylinder and applying simple transformations like Translation, Scaling, Rotation, Composite transformations, projections –Parallel, Perspective.

UNIT III

Clipping: Clipping operations, Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky Algorithm, Nicholl-Lee-Nicholl Algorithm. Polygon clipping: Sutherland- Hodgeman Algorithm, Weiler Atherton Algorithm. Text clipping, Exterior clipping.

UNIT IV

Finding out visible surfaces and removal of hidden surfaces in simple objects using object space and image space algorithms, Image enhancement, Image transformation from color to gray scale and vice versa, Image manipulation and Image optimization for web - Usage of editing tools, layers, filters, special effects and color modes. Creation of simple Gif animated images with textual illustrations, Image Compression.

UNIT V

Color Models and Color Application: Color models: Properties of Light. Standard Primaries and the Chromaticity Diagram, XYZ Color Model, CIE Chromaticity Diagram. RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model. Conversion between HSV and RGB Models. HLS Color Model, Color Selection and Application. Advancements in the technology in Computer Graphics.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand the structure of modern computer graphics systems.
- Understand the basic principles of implementing computer graphics primitives.
- Familiarity with key algorithms for modelling and rendering graphical data.
- Develop design and problem solving skills with application to computer graphics.
- Gain experience in constructing interactive computer graphics programs using OpenGL.

BOOKS RECOMMENDED:

- [1] A.P.Godse, D.A.Godse, Computer Graphics and Multimedia, Technical Publications, 2009.
- [2] D. Hearn & M. Pauline Baker, Computer Graphics, Second Edition, Prentice Hall of India, 1996.
- [3] David F. Rogers, Procedural Element of computer Graphics, McGraw Hill International, 1985.
- [4] William M. Newman Robert F. Sproull, Principles of Interactive Computer Graphics, McGraw Hill, 1979.
- [5] D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, Introduction to Computer Graphics, Addison-Wesley, 1994.
- [6] D. P. Mukherjee, Fundamentals Of Computer Graphics And Multimedia, PHI, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II				
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM2EM1: Operations	L	T	P	L	T	P	Total
Research-I	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The course aims at making the students aware of the various techniques, which provides an analytical and objective basis for decisions. These techniques use scientific methods to problems arising from operations involving integrated men, machine and materials and provide a mathematical model to represent complex functional relationships.
- To understand the mathematical tools that are needed to solve optimization problems.
- To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like LPP, Transportation, Assignment, Queuing etc.

Prerequisite(s): Basic knowledge of differentiation & integration of functions, vector algebra, determinants & matrices and calculus of finite difference.

COURSE OF CONTENTS

UNIT I

Introduction to Operations Research, Linear Programming: Principles of Simplex Method, Simplex Method in Tabular Form, Big-M method, Two phase method, Duality and Dual Simplex Method, Degeneracy and Cycling.

UNIT II

Assignment models: Definition, Mathematical Representation, Formulation and Solution, Alternate optimal solution. Transportation Problems: Definition, Formulation and solution, Alternate optimal solution. Travelling salesman problem

UNIT III

Queuing Theory: Objectives and Different Characteristics of a Queuing System, classification of Queuing models, probability distribution of arrival and service times, Models (M/M/1, M/M/C, M/E_k/1, M/D/1, D/D/1).

UNIT IV

Inventory management system, EOQ model with shortage, without shortage and with constraints.

UNIT V

Sequencing Models: Processing n jobs through two machines, m machines, and processing two jobs through m machines.

Simulation: Building a simulation model, Monte-Carlo simulation and applications.

Learning Outcomes:

On completion of this course students should be able to:

- [5] Apply linear programming models in different practical situations.
- [6] Optimize the resources different conditions.
- [7] Know the various situation for queuing in service and industrial situations.
- [8] Develop inventory models for various real-life situations.

BOOKS RECOMMENDED:

- [2]. Hillier, F. S. and Lieberman, G. J. – Introduction to Operation Research, 8th Ed., New York, McGraw- Hill, 2005.
- [3]. Taha, H. A. – Operations Research: An Introduction, 7th ed., Macmillan Publication Co., 2003.
- [4]. Sharma, S.D. – Operations Research, Kedarnath Ramnath & Co., Meerut, 2004.
- [5]. Dantzig G., Thapa M. Linear programming 1: Introduction, Springer, 1997.
- [6]. P K Gupta & D S Hira, Operations Research, S. Chand., 2008.
- [7]. J.K. Sharma, Operations Research: Theory and Application, 3rd Ed., Macmillan, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- II				
Subject Code & Name		Instructions Hours per Week			Credits			
AM2EM2: Soft Computing Techniques		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	-	3	1	-	4

Learning Objectives:

1. To introduce the basic notions and study the techniques of Fuzzy mathematics and study neural network and genetic algorithm.
2. Evaluate and compare solutions by various soft computing approaches for a given problem.

Prerequisites: Knowledge of Set theory, algebra of functions.

COURSE OF CONTENTS

UNIT I

Crisp sets, Fuzzy sets and their basic concepts, operations on fuzzy sets, Fuzzy arithmetic, Fuzzy relations, Fuzzy relation equations based on sup – i composition and on Inf – wi composition.

UNIT II

Fuzzy measure, Evidence theory, Possibility theory, Fuzzy sets and possibility theory, Uncertainty based Information.

UNIT III

Fuzzy logic, Classical logic, multivalued logic, Fuzzy propositions, Fuzzy quantifiers, inference from conditional fuzzy propositions. Methods of construction : An overview

– Direct methods with one expert – Direct method with multiple experts – Indirect method with multiple experts and one expert – Construction from sample data, Defuzzification, Fuzzy Controllers and their applications.

UNIT IV

Basic concepts, Model of artificial neural Network (ANN), Neural Network architectures, learning methods, Back propagation networks, architecture of back propagation networks, Associative memory, Auto correlators, Adaptive resonance theory, Introduction to ART1 and ART2, Applications.

UNIT V Fundamentals of Genetic Algorithms (GAs), history, basic concepts and biological background, working principle, encoding, fitness function, reproduction, Genetic modeling, various operators, crossover and mutation, convergence of Genetic Algorithm, Applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Identify and describe soft computing techniques and their roles in building intelligent machines.
- Apply fuzzy logic and reasoning to handle uncertainty and solve practical problems.
- Apply genetic algorithms to combinatorial optimization problems.
- Apply neural networks to pattern classification and regression problems.

BOOKS RECOMMENDED:

- [1] Rajsekaran, G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy logic and Genetic Algorithms: Synthesis and Applications, PHI, New Delhi, 2005.
- [2] G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
- [3] H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, 1996.
- [4] David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Kluwer Academic Publishers, Boston, MA, 1989.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

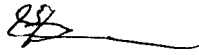
Sub: Minutes of Departmental Committee Meeting held on 2/7/2016

Department heads presented the syllabus and scheme of 3rd Sem. Committee has approved the syllabus and scheme of 3rd Sem, after thorough discussion, for following branches of BE, BE (Part Time- Mechanical), ME Regular, ME (Part Time) and MSc.;

- BE Mechanical Engineering
- BE Computer Engineering
- BE Electronics & Instrumentation Engineering
- BE Information Technology
- BE Electronics & Telecommunication Engineering
- BE Civil Engineering
- ME Computer Engineering with specialization in *Software Engineering*
- ME Information Technology with specialization in *Information Security*
- ME Electronics Engineering with specialization in *Digital Instrumentation*
- ME Electronics Engineering with specialization in *Digital Communication*
- ME Industrial Engineering & Management
- ME Mechanical Engineering with specialization in *Thermal & Design Engineering*
- MSc Applied Mathematics



Dr. N. Sohani



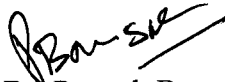
Dr. G.L. Prajapati



Dr. Ashesh Tiwari



Dr. Ravi Sindal



Dr. Pratosh Bansal



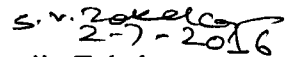
Dr. Shashi Prakash



Dr. Vrinda. Tokekar



Dr. Ajay Verma



Dr. Sanjiv Tokekar

MECHANICAL ENGINEERING DEPARTMENT
SCHEME & SYLLABUS
IInd YEAR

S.NO	Sub Code	Sub Name	Type	L-T-P	Credits
1	AMR3C1	APPLIED MATHEMATICS-III	PC	3-1-0	4
2	MER3C2	STRENGTH OF MATERIAL	PC	3-1-1	4+1 (P)
3	MER3C3	MATERIAL SCIENCE	PC	3-1-1	4+1 (P)
4	MER3C4	MANUFACTURING PROCESS	PC	3-1-1	4+1 (P)
5	MER3G1	APPLIED THERMODYNAMICS	GE	3-1-0	4
6	MER3L1	WORKSHOP / PRACTICAL (APP. THERMODYNAMICS)		0-0-1	1(P)
7	SMR3S3	EFFECTIVE COMMUNICATION SKILL		2-0-0	2
8	MER3V3	COMPREHENSIVE VIVA-III	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
AMR3C1: APPLIED MATHEMATICS-III	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like, Laplace transform to solve the diffusion equation, heat transfer equation, mass transport, heat transport, fluid transport, and process controls; Complex Analysis in fluid mechanics and potential theory useful in steady state conduction, electrostatic and gravitational fields; Fourier analysis relevant for PDE-solving and probably the heat equation in three dimensions. Vibration sensitive instruments with Fourier transformers attached can be used for tuning pianos and motor engines, for aircraft and submarine detection and so on.
- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Pre requisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and complex numbers.

COURSE CONTENTS

UNIT-I

Laplace transform: Definition and properties of Laplace transform, Inverse Laplace Transforms. Convolution theorem, Application of Laplace transform in solution of ordinary differential equations, Simultaneous differential equations with constant coefficients.

UNIT-II

Function of Complex variables: Analytic functions, Cauchy-Riemann conditions, Harmonic functions, Conjugate functions and their applications, Cauchy's integral theorem, Cauchy's integral formula, Taylor's and Laurent's series, Residue theorem, Solution of integrals, Conformal transformation, bilinear transformation, their properties and classification.

UNIT-III

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-Falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.

Numerical Solutions of ordinary differential equations - Single and multi-step methods.

Numerical solution of partial differential equation: Classification of second order Partial differential equation, Solution of elliptic, parabolic and hyperbolic equations by Iteration method.

UNIT-IV

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals, Numerical differentiation, General quadrature formula, Numerical integration using Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule, Simpson's $3/8^{\text{th}}$ rule, Weddle's rule.

UNIT-V

Fourier series, Fourier Integral, Fourier transforms, Finite Fourier sine and cosine transform, Parseval's theorem, continuous time and discrete time Fourier Transform, DFT and FFT, solution of partial differential equations with constant and variable coefficients.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Apply Laplace Transform methods, useful in problems where mechanical/electrical driving force has discontinuities, is impulsive or is a complicated periodic function.
2. The course aims at developing the fundamentals of Complex Analysis, applicable to potential theory useful in steady state conduction, electrostatic and gravitational fields.
3. Apply Fourier Theory to analyze the quality of signals, how crosstalk, interference, noise, and distortion affect signal quality and to extract information from noisy signals.
4. Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equation, numerical methods work very well.

BOOKS RECOMMENDED:

- [1] B.S. Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
- [2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
- [3] Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [4] Kanasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
- [5] A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
- [6] Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.
- [7] J. F. James, A Student's Guide to Fourier Transforms with Applications in Physics and Engineering, 3rd Edition, Cambridge University Press, 2011.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C2 STRENGTH OF MATERIALS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the knowledge of Strength/Load Bearing capacity of Different Materials.
- To give basic concepts of different types of stresses & strain/ Mechanics of Material.
- To develop skill to analyze the distribution of stresses in material.
- To know how to find the Torsional stresses and Beam strength of column.

Pre requisite(s): Engineering Physics, Engineering Mathematics

COURSE CONTENTS

UNIT-I

Stress and strain: Tensile, compressive and shear stresses, complimentary shear stresses with varying cross section, Temperature stresses, Modulus of Elasticity. Modulus of rigidity, Bulk modulus, Poisson's ratio, Relations between the three moduli, Stress on oblique Section of a bar subjected to axial stress, Compound stresses, Principle stresses & strain, Mohr's circle of stresses and strain.

Elastic strain energy, Different type of loading, Resilience, Proof resilience, Strain energy in Tensile, Static, Sudden falling, gradually applied and Impact loading. Strain energy due to shear stresses.

UNIT-II

Shear force and Bending moment of Beams: Beams, Classification of beams, Types of loading, span, Shear force and Bending moment, Relation between load, shear force and bending moment, shear force and bending moment diagram for cantilever and simply supported beam with concentrated load, Point load, uniformly distributed load, gradually varying load, Eccentric point load.

UNIT-III

Bending stresses & Deflection of Beams: Introduction, Pure Bending ,Simple Bending theory, Expression for Bending Stress, Moment of inertia of section, Bending Stresses in Symmetrical Section, Shearing stresses in Beams, Distribution of shearing stress in different sections..

Slope & Deflection of Beam subjected to Uniform Bending Moment, Relation between Slope, Deflection and Radius of Curvature, Deflection of simply supported beam carrying a point load and uniform distributed load, Macaulay's Method and Moment Area Method for finding out deflection of beam.

UNIT-IV

Torsion of Circular shaft: Introduction, Pure Torsion, Torsional stress & strain in circular shafts, Polar moment of Inertia, Torsional moment of resistance, Torsion equation of circular

shaft, Power transmitted by shaft, composite shaft, Strength of shaft, Torsional shear stress in shaft, Shaft of varying section.

UNIT-V

Columns & Struts: Introduction, Classification of column, Failure of column Euler's theory for column, End conditions of column and struts, Equivalent length of column, Calculation of equivalent length for different end conditions of column, Slenderness ratio, limitations of Euler's formula, Rankin's formula for long column and eccentric loading. Formula for Indian standard code of practice.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn behavior of different material under different types of loading.
2. To understand the basic concepts of Principal Stress & Strain.
3. Learn basic fundamentals used in Designing a Mechanical Component.
4. Design the column & struts used in Mechanical as well as Civil Engineering.

BOOKS RECOMMENDED:

- [1] Warnock Ramamurtham, *Strength of Materials*, 16/e, Dhanpat Rai Publications, 2011
- [2] Bansal R K, *Strength of Materials*, 4/e, Laxmi Publications(P) Ltd, 2012
- [3] Popov *Mechanics of Solids*, 2/e, Pearson Education (India), 1998
- [4] Timoshenko, *Elements of Strength of Materials*, 3/e, Wadsworth Publishing; 2004

LIST OF PRACTICAL ASSIGNMENT

1. Performance of Tensile test to obtained tensile properties of the material.
2. Performance of Tensile test to obtained Stress-Strain curve for Different Material.
3. Performance of Compressive test to obtained Compressive properties of the material.
4. Performance of Shear test to obtained Shear properties of the material.
5. Performance of bending test to obtained Bending properties of the material.
6. Performance of Brinell hardness Test.
7. Performance of Vickers Hardness Test.
8. Performance of Torsion test to obtained torsional properties of the material.
9. Performance of Torsion test to obtained T- θ Curve.
10. Performance of Impact test to obtained Impact Strength of the materials.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C3 MATERIAL SCIENCE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To render the information that involves investigating the relationship that exists between the structures and properties of materials.
- To provide the knowledge of Engineering Materials.
- To give basic concepts of Material properties in terms of their utilization in machine design.
- To provide the knowledge about testing of materials

Pre requisite(s): Engineering chemistry, Engineering Physics.

COURSE CONTENTS

UNIT-I

Description of Crystal Structure and Imperfections in metal crystals : Review of crystal structure :Seven Crystal System. Bravais lattice. Symmetry and properties of simple crystal structure, Millers indices. Imperfections in metal crystals, Point Defects, Edge Dislocation, Screw dislocations slip planes.

UNIT-II

Ferrous and Non-Ferrous Metals and Alloys : Properties and application of various steels and cast iron. Effect of impurities, in ferrous metals. Effect of common alloying elements on the steels, High speed steels, Stainless steel, Other steel. Corrosion and its prevention. Composition, microstructure, properties and applications of Aluminum and its principle alloys, Copper and its principle alloys, Nickel and its principle alloys.

UNIT-III

Concept of Phase Diagrams and Equilibrium Diagrams : Iron Allotropy, cooling curves, phase diagrams, Gibbs phase rule, Various types of phase diagrams, Interpretation of Phase diagrams, Iron carbon equilibrium diagram, Classification of Equilibrium Diagrams: Eutectic, Eutectoid and Peritectic transformation, Iron carbon equilibrium diagram, TTT diagrams, Comparison of Iron carbon equilibrium diagram and TTT diagrams.

UNIT-IV

Heat Treatment of Metals and Alloys and Powder metallurgy : Classification of Heat treatment processes, Surface or case hardening of steel, Defects in heat treated parts. Manufacturing of metal powders. Sintering and secondary operations. Design considerations and applications.

UNIT-V

Metallography, Destructive and Non-Destructive Testing : Introduction to Metallography, Study of sample preparation and metallurgical Microscope. Study of Mechanical Properties and their significance in Engineering Applications, Classification of testing of materials, Tensile, Compression, Bend, Torsion, Fatigue, Impact, Hardness, Creep Tests, Ultrasonic, Magnetic, Radiography Tests etc.

Learning Outcomes:

After Completing the Course, Student will be able to:

1. Have the knowledge of materials.
2. Understand the mechanical properties of materials.
3. Know about the development of new materials having comparable properties.
4. Consider the “cradle-to-grave” life cycle of materials relative to machine design and manufacturing processes.

BOOKS RECOMMENDED:

- [1] Callister W.D.Jr., Materials Science and Engineering an Introduction, Wiley Publications(P) Ltd,2004.
- [2] Askeland D. R.,Fulay,P.P., Essentials of Materials Science and Engineering, Cengage Learning Publications,2010
- [3] Raghavan, V.,Materials Science and Engineering, Prentice-Hall of India (P) Ltd.,2001.
- [4] Khanna, O.,P., Material Science and Metallurgy, Dhanpat Rai Publications,2005

LIST OF PRACTICAL ASSIGNMENT

1. Performance of hardness test of ferrous materials using Rock Well hardness testing machine
2. Performance of magnetic particle crack detection to detect the cracks
3. Performance of impact test on a plastic test sample to detect impact strength of material.
4. Performance of crack detection using ultrasonic crack detector.
5. Study and perform steps involved in sample preparation for observing the microstructure under metallurgical microscope
6. Study and perform various heat treatment process using muffle furnace
7. Study of construction and function of metallurgical microscope.
8. Study of microstructures of ferrous metal alloys
9. Study of iron carbon diagram
10. Study of T.T.T. diagram

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C4 MANUFACTURING PROCESSES	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To provide an understanding of the various processes which are used extensively in the manufacturing of mechanical components.
- To learn about the constructional features of the standard types of machine tools used in shop floor
- To learn about the process parameters and the standard tooling used on various machine tools.
- To learn about the basic measurement and inspection tools used in shop floor.

Pre requisite(s): Elements of Mechanical Engineering, Workshop Practice

COURSE CONTENTS

UNIT-I

Production of Axi-symmetric Parts: Introduction to the mechanics of metal cutting, Turning and related processes, Turning parameters, Constructional features and operation of turning and related machine tools: Lathes, Capstan-Turret lathes, Automats, CNC lathes, Machining centers and Turning centers. Single point cutting tools: types and geometry, Tool Materials.

UNIT-II

Production of Prismatic Parts: Introduction to the Shaping, Planning and Milling processes and their process parameters, Constructional features and operation of Shaper, Planner, Slotter and Milling machines, Tool holding, Work holding and Indexing methods, Cutting tools: types and geometry.

UNIT-III

Drilling, Broaching, Screw Thread and Gear cutting: Introduction to operations like Drilling, Boring, Reaming, Counter Boring and Counter Sinking. Machine Tools for drilling and related hole making processes, Drilling machine accessories, Process parameters for drilling and boring operations, Accuracy and finish of drilled holes, Broaching processes and broaching machines, power calculations. Cutting tools like drills, reamer, broach and taps: types and geometry. Thread forms and thread fits, External and Internal thread cutting processes. Gear: types and methods of gear manufacturing, Machine tools and tooling used for gear manufacturing.

UNIT-IV

Abrasive Machining: Introduction to various grinding operations, Types of abrasives and bonds, Marking system for grinding wheels and their selection criteria, Mechanics of grinding, Truing and dressing of grinding wheels, Grinding machines for cylindrical and surface grinding, Tool & cutter grinders. Safety in grinding, Other abrasive processes: Honing, Lapping, Super finishing, Polishing and Buffing.

UNIT-V

Metrology: Basic measurements and the use of Squares and Surface Plates, Micrometers, Vernier Calipers, Gage blocks, Inside, Depth and Height measuring instruments, Angular measurements, Limits, tolerances and fits: Need for limit systems, Interchangeability, Statistical assembly, Selective assembly, Limit system. Taylor's principles of gauge design, Gauge tolerance and wear allowances, Types of limit gauges, Thread or screw gauges, Advantages & limitation of limit gauges. Measurement and inspection of external screw threads and gears.

Learning Outcomes :

Upon Completing the Course, Student will able to:

1. Identify the processes used for the manufacturing of components of various sizes and shapes.
2. Understand the construction and working of the machine tools used for various operations along with the hands on experience of some of them during laboratory work.
3. Select the tooling and the process parameters for the processing of common engineering work materials.
4. Understand the use of basic measurement and inspection tools used in shop floor, recognize and design the three types of plug and ring gauges based on the limit system.

BOOKS RECOMMENDED:

- [1] Gupta I.C., *A Textbook of Engineering Metrology*, 7ed, Dhanpat Rai Publications.
- [2] Sharma P. C., *Production Technology, Production Engineering*, S. Chand and Co.
- [3] HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd.
- [4] Chapman W.A.J., *Workshop Technology Part 1, 2 and 3*, 4ed, Viva Books Private Ltd.
- [5] Hajra Choudhury A.K., Hajra Choudhury S.K., Roy Nirjhar *Elements of Workshop Technology : Machine Tools* (Volume - 2), Media Promoters and Publishers Pvt. Ltd.

List of Practical Assignment:

1. Study of the geometry of single point cutting tools.
2. Study of the geometry of milling cutters.
3. Study of the geometry of double fluted twist drill.
4. Study of the geometry of Taps and Reamer.
5. Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
6. Study of constructional features of the Shaper and to machine a job as per given dimensions on it.
7. Study of constructional features of the Milling m/c and to machine a job as per given dimensions on it.
8. To study the indexing of workparts, to be milled, using a dividing head.
9. Study of comparators.
10. Measurement and inspection of screw threads and cutting tools using a Tool Makers Microscope and Profile Projector.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER3G1 APPLIED THERMODYNAMICS	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The basic objectives of the subject are:

- To understand fundamentals of thermal systems and their processes.
- To understand the engineering applications of thermodynamics

Prerequisite(s): Engineering Physics and Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT- I

Second Law of Thermodynamics: Cyclic Heat Engine, Kelvin Planck Statement, Claussius Statement, Equivalence of Kelvin Planck and Claussius Statements, Reversibility and Irreversibility, Carnot Cycle, Carnot's Theorem, Absolute Thermodynamic Temperature Scale, Efficiency of the Reversible Heat Engine, Illustrative Problems .

UNIT- II

Entropy: Introduction, Claussius Theorem, Property of Entropy, Inequality of Claussius, Entropy change in an Irreversible Processes, Entropy Principle, Applications of Entropy Principle, Entropy Transfer with Heat Flow, Entropy and Disorder, Absolute Entropy Illustrative Problems .

UNIT- III

Fuels and Combustion: Introduction, Classifications of fuels, Combustion Equations, Theoretical Air and Excess Air, Stoichiometric Air-Fuel Ratio, Weight of Carbon in Flue Gases, Weight of Flue Gases per kg of Fuel Burnt, Analysis of Exhaust and Flue Gases .

UNIT-IV

Thermodynamic Relations: Mathematical Theorems, Maxwell's Equations, TdS Equations, Difference in Heat Capacities, Ratio of Heat Capacities, Energy Equation, Joule-Kelvin Effect, Illustrative Problems.

UNIT- V

Gas Compressors: Compression Processes, Work of Compression, Single Stage Reciprocating Air Compressor, Volumetric Efficiency, Multi Stage Compression, Illustrative Problems .

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
2. To understand the basic concepts of heat transfer and work transfer involved in the process.
3. Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

BOOKS RECOMMENDED:

- [1] Yunus A Cengel ,*Thermodynamics-An Engineering Approach*, Tata Mc-Graw Hill Publishing House, New Delhi, V Edition.
- [2] Sonntag R E, Van Wylen G J, Borgnakke C, *Fundamentals of Thermodynamics*, John Wiley & Sons Pte Limited , Singapore, V Edition.
- [3] Nag P K , *Engineering Thermodynamics*, Tata Mc-Graw Hill, New Delhi, V Edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER3L1 WORKSHOP/PRACTICALS SEMINAR	L	T	P	L	T	P	Total
	0	0	2	0	0	2	2
Duration of Theory Paper: 0 Hours							

Learning Objectives:

The basic objectives of the subject are:

- To understand Practical of thermal systems and their processes.
- To understand the Practical applications of thermodynamics

Prerequisite(s): Engineering Physics and Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT- 1

Second Law of Thermodynamics:

1. Finding out the Coefficient of Performance of a refrigerator.
2. Finding out Energy Performance Ratio of a refrigerating plant used as a heat pump.
3. Establishing the relation between EPR and COP.

UNIT- II

Entropy:

1. Verifying the entropy principles in generalized fluid flow.

UNIT- III

Fuels and Combustion: Introduction, Classifications of fuels, Combustion Equations, Theoretical Air and Excess Air, Stoichiometric Air-Fuel Ratio, Weight of Carbon in Flue Gases, Weight of Flue Gases per kg of Fuel Burnt, Analysis of Exhaust and Flue Gases .

UNIT-IV

Thermodynamic Relations:

1. Derive the Maxwell equation in Thermodynamic relations.
2. Derive the Tds equation in Thermodynamic relations.

UNIT- V

Gas Compressors:

1. Finding out the Isothermal, Volumetric Efficiency of the Reciprocating Air Compressor.
2. Finding out the effectiveness of the intercooler in two stage compressor.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
2. To understand the basic concepts of heat transfer and work transfer involved in the process.
3. Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

BOOKS RECOMMENDED:

- [1] Yunus A Cengel ,*Thermodynamics-An Engineering Approach*, Tata Mc-Graw Hill Publishing House, New Delhi, V Edition
- [2] Sonntag R E, Van Wylen G J, Borgnakke C, *Fundamentals of Thermodynamics*, John Wiley & Sons Pte Limited , Singapore, V Edition
- [3] Nag P K , *Engineering Thermodynamics*, Tata Mc-Graw Hill, New Delhi, V Edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SMR3S3 EFFECTIVE COMMUNICATION SKILL	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of communication.
- To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.
- To develop soft skills of presentation, for developing affectivity in communication.

Pre requisite(s): Basic English.

COURSE CONTENTS

UNIT-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Types of Communication; Art of Communication. Barriers of Communication and their remedies.

UNIT-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts; Telephone speaking skills and Cross-cultural communication skills.

UNIT-III

Fundamentals of public Speaking: Speeches on topics of current concern ,listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

UNIT-IV

Interviews: Points to be remembered as an interviewer or an interviewee; commonly asked questions; Types of interviews; Do's and Don'ts.

UNIT-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Nonverbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand importance of communication process.
- Understand importance of presentation.
- Improve the barriers of communication.
- Participate in interviews and group discussion.

BOOKS RECOMMENDED:

- [1] Chaturvedi P D, Chaturvedi M, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.
- [2] ICMR, *Business Communication*, Feb 2001.
- [3] Davies J, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education, 2006.

COMPUTER ENGINEERING DEPARTMENT
SCHEME & SYLLABUS
IIIrd YEAR

S No	Sub Code	Sub Name	Type	L-T-P	Credits
1.	ACR3C1	Applied Mathematics - III	PC	3-1-0	4
2.	CER3C2	Object Oriented Programming	PC	3-1-1	4+1(P)
3.	CER3C3	Data Structures	PC	3-1-1	4+1(P)
4.	CER3C4	Digital Electronics	PC	3-1-1	4+1(P)
5.	CER3G1	Computer Organization & Architecture	GE	3-1-0	4
6.	CER3L1	Computer Hardware Lab	--	0-0-1	1
7.	SCR3S3	Environmental Studies	--	2-0-0	2
8.	CER3V3	Comprehensive Viva - III	Virtual	0-0-4	4
Total Credits					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ACR3C1 APPLIED MATHEMATICS – III	L	T	P	L	T	P	Total
	Duration of Theory Paper: 3 Hours	3	1	0	3	1	0

Learning Objectives:

- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.
- The optimization techniques make the students aware of the various techniques, which provide an analytical and objective basis for decisions.

Prerequisites: Matrix, probability theory, elementary statistics.

UNIT-I

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation: Gauss-Seidel, Gauss Jacobi's and relaxation methods.

Numerical solution of first order ordinary differential equations by Euler's and Runge's methods.

UNIT-II

Interpolation: Finite difference operators, Newton's and central difference interpolation formulae, divided differences, Lagrange's interpolation.

Numerical differentiation using newton's formulae, maxima and minima.

Numerical integration- general quadrature formula, trapezoidal rule, Simpson's 1/3 and 3/8 rules, Weddle's rule.

UNIT-III

Correlation and regression analysis – linear correlation and regression, regression plane, multiple and partial correlation. Random variables-discrete and continuous random variables, probability and density functions, cumulative distribution function, mathematical expectation, normal distribution.

UNIT-IV

Testing of hypothesis- parameter and statistics, sampling distribution of a statistic, standard error, null and alternative hypothesis, test of significance of large samples and small samples, test of goodness of fit and independence of attributes.

UNIT-V

Random (stochastic) processes and their classifications, special random process –Markov process, Markov chain, classification of Markov chains-regular, homogeneous, irreducible (ergodic) and reducible Markov chains, classification of states-period and aperiodic, persistent (recurrent) and transient, absorbing states, steady state distribution.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equation, numerical methods work very well.
- Use the optimization techniques to provide a mathematical model to represent complex functional relationships.

Books Recommended:

- [1]B.S.Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
- [2]Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
- [3]Gupta P.P., Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [4]T Veerarajan, Probability, statistics and random processes, 2nd edition, Tata McGraw-Hill, New Delhi, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER3C2 OBJECT ORIENTED PROGRAMMING	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To provide the knowledge of Object Oriented Programming Paradigm.
- To learn basic constructs of programming language that are implementing tools for object oriented program development.
- To develop skill to analyze and code for problem solution in object oriented approach.

Pre-requisites: Basic skills of Programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming: Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behaviour, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT-II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

UNIT-III

Inheritance and Polymorphism: Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and Packages.

UNIT-IV

Exception Handling and Multithreading: Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating custom exceptions. Multithreading: Introduction, Priorities and scheduling, Inter-thread communication, Thread Synchronization and its life cycle.

UNIT-V

Java I/O, Applets and Event Handling: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Analyze and code the solution to problem using object oriented paradigm.
2. Understand Java language constructs.
3. Apply object model for software development

BOOKS RECOMMENDED:

- [1] Cay S.Horstmann, *Core JAVA Vol-1*, 9/e, Pearson Education 2012.
- [2] Herbert Schildt, *The complete Reference*, 9/e, Tata McGraw Hill 2014.
- [3] Scott W Amber, *The Object Primer*, 3/e, Cambridge 2004.
- [4] Timothy Budd, *Object Oriented Programming*, 3/e, Pearson Education 2002.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2/e , Oreilly Publications 2005.

List of Practical Assignment:

1. Experiments to understand program development environment for Java language.
2. Writing program to learn basic language constructs like identifier, variables, data types and console input/output..
3. Writing program to learn control statements.
4. Writing program to use class and objects to model problem domain entity in program domain.
5. Writing program to use inheritance and polymorphism features.
6. Programs to use exception and understanding modeling errant condition in execution as class and objects.
7. Experiments to learn Multi-Thread execution.
8. Writing program to code applications needing concurrency and exploring inter-thread communication mechanism.
9. Experiments to understand stream concept and study various stream abstractions and implementation available in the language
10. Exploring GUI components and understanding Event Delegation Model. Understanding (GUI) objects and their communication based program to realize object oriented programming in action.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER3C3 DATA STRUCTURES	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

Prerequisites: Computer Programming knowledge

COURSE CONTENTS

Unit-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations: static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree & its applications, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs – BFS, DFS, Shortest path in graphs, Applications.

Learning Outcomes:

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem..
4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983.
- [2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
- [3] Kruz, Data Structure and Programming Design, 1987.
- [4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
- [5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER3C4 Digital Electronics	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To provide knowledge of different data representation systems for digital computers.
- Familiarize students with different hardware implementation techniques of different logic functions.
- Develop skills to design and implement various combinational and sequential circuits
- Develop ability to implement digital circuits in various practical applications.
- Provide knowledge of data converters and basic understanding of Microprocessors

Pre requisites: Nil

UNIT-I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's - speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters.

UNIT-II

Combinational Circuits: Boolean laws & algebra, Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri-state Devices, Combinational circuit design for Adder, Subtractor, Comparator, Code converters.

UNIT-III

Sequential Circuits: Latches and Flip-Flops SR, D, T, JK, Master-slave, Flip-Flop conversions, Synchronous counter, Asynchronous counter, Up-Down Counter.

UNIT-IV

Registers: Shift Registers, serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register, Sequence Generators, Designing of Synchronous & Asynchronous sequential circuits.

UNIT-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, Conversions as Flash type, Counter type, Successive Approximations type A/D converter, Clock generation through IC555, Memory- Types ROM, RAM, Introduction to Microprocessor, Microprocessor Evaluation, Programming and hardware model of Microprocessor, 8/16/32/64 bit Series of Microprocessors.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Understand how to represent data in digital form.
2. Understand driving capacity of a gate and voltage-current parameters
3. Design and Analyse any combinational and sequential digital circuit
4. Using analog to digital and digital to analog IC's for data conversion.
5. Understand basics of microprocessors

BOOKS RECOMMENDED:

- 1) Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
- 2) William H. Gothmann, *Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition, Prentice-Hall of India Private Limited, New Delhi., 2001
- 3) William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- 4) S Salivahan, S Arivazhagan "Digital Circuit and Design" Vikas Publication
- 5) Ramesh S. Gaonkar, *Microprocessor, Architecture, Programming, and Applications with the 8085*, Penram International Publication.

List of Practical Assignment:

During the learning of course, students need to do assignments:

1. To Implement various gates using universal NAND/NOR IC's.
2. To Design and Implement various combinational circuits using gate IC's.
3. To Design and Implement various combinational circuits using Mux, D Mux, Encoder, Decoder IC's. To learn and analyze different Flip-Flops.
4. To Design and Implement various sequential circuits using Flip-Flop.
5. To learn and analyse Counter IC's.
6. To Design and Implement various sequential circuits.
7. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
8. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER3G1 COMPUTER ORGANIZATION & ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide a framework for understanding the fundamentals of computing.
- To familiarize students with relationship between hardware and software to focus on the concepts that are the basis for current computers.
- Develop skills to understand how to design a computer.
- Develop ability to understand how to enhance performance of a computer system.

Prerequisites: NIL

COURSE CONTENTS

Unit-I

Introduction: Difference Between Computer Organization and Computer Architecture, Computer Types, Flynn's Classification, Functional Units, Basic Operational Concepts: Bus Structures, Software; Performance: Processor Clock, Basic Performance Equation, Clock Rate, Compiler, Performance Measurement; Multiprocessors and Multicomputers, Historical Perspective: Generation of computer, Evolution of Performance; Arithmetic for Computers: Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Booth Algorithm, Floating Point Arithmetic: Addition and Multiplication.

Unit-II

Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory; Memory Speed, Size and Cost Considerations; Cache Memories: Mapping Functions, Replacement Algorithms, Performance Considerations, Hit Rate and Miss Penalty, Caches on the Processor Chip; Virtual Memories: Address Translation; Memory Management Requirements.

Unit-III

Processing Unit: Addressing Modes, Connections between the Processor and the Memory, Processor Activity, Instruction cycle, John Von Neumann Architecture, State Machine Concept, Processor as a State Machine, Data Path Architecture, Data Path Controller: Microprogrammed; Hardwired Design, Firmware Design, Microcontroller Design, Design of Flip-Flop to understand the Design of CPU.

Unit-IV

Input Output Organization: I/O Devices: Introduction, Typical Collection, Diversity; Dependability, Reliability, Availability, Disk Storage, Flash Storage, Connecting Processor Memory and I/O Devices, Connection Basics, Interfacing I/O Devices to the Processor Memory and Operating System: Giving Commands to I/O Devices, Communicating with the Processor, Interrupt Priority Levels, Transferring the Data between a Device and Memory, Direct Memory Access and the Memory System; I/O Performance Measures, Impact of I/O on System Performance.

Unit-V

Pipelining & Multiprocessors: Principles of Pipelining, Principles of Linear Pipelining, Clock Period, Speedup, Efficiency, Throughput, Classification of Pipeline Processor, General Pipelines and Reservation Tables, Collision Vector, State Diagram for a Pipeline, Pipeline Hazards, Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors, Introduction to Graphics Processing Units, Introduction to Multiprocessor Network Topologies.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Acquire advance knowledge and understanding of computing.
2. Use skills in computer design.
3. Apply acquired knowledge to improve performance of a computer.
4. In addition to development in technology student will be able to innovate in the architecture of computers, such as the use of caches and pipelining.

Books Recommended:

- [1] Computer Organization, 5th Ed., C. Hamacher, Z. Vranesic, S. Zaky, McGraw Hill International Edition 2002.
- [2] Computer Organization and Design, 5th Ed. ,David A. Patterson, John L. Hennessy, The hardware/software interface, Morgan Kaufmann Publisher, 2014.
- [3] Patterson & Hennessy, Computer Organization and Design, Morgan Kaufmann Publisher, 2007.
- [4] Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Briggs, McGraw Hill Education, 2012.

List of Assignments (Theory):

During the learning of course, students need to do assignments:

1. Performance measurement of a Computer.
2. Arithmetic for Computers.
3. Cache Hit Rate/Miss Penalty issues.
4. Virtual Memory: Address Translation.
5. Use of Addressing Modes.
6. Study on designs of CPU.
7. Secondary storage performance.
8. Impact of I/O on system performance.
9. Pipelining performance.
10. Multi-core, GPU Processor and Mltiprocessor : A Comparison.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER3L1 Computer Hardware Lab	0	0	2	0	0	1	1

Learning Objectives:

- To provide the knowledge of computer Hardware parts and latest technology.
- To give basic Knowledge of working internal part of system.
- To develop skill to analyze and find the fault in System.
- To know how to assembling the hardware parts.

Pre requisites : NIL

COURSE CONTENTS

UNIT-I

Central Processing Unit - Basics of Processor and Computer Generation, Study of Different Processor, Pentium, Dual Core, Quad Core , I3, I5, I7 Processor, Motherboards, Chipset and Controllers, BIOS and the Boot Process.

UNIT-II

Internal Components - IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Internal Ports, Cables and Connector Types, SMPS.

UNIT-III

Computer Peripherals - Monitors:- CRT, LCD and LED Displays, Printers:- Dot-Matrix Printer, Inkjet Printer, Laser Printer

Scanner:- Photo Scanner, Documents Scanner, Bar Cord Scanner, Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.

UNIT-IV

Memory and Networking Devices - Computer memory: Primary Memory- RAM, ROM, Secondary memory, Switches, Routers, Modems.

UNIT-V

Assembling and Installation - Assembled the Hardware Parts, Different types of Operating systems, System files FAT and NTFS, DOS, Windows XP, Windows Vista, Windows 7 and Windows 8 and Red Hat Linux and Multi Boot Operating System and latest OS.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. learn the knowledge of hardware parts and Assemble a computer System and Installation & Uninstallation of Software.

BOOKS RECOMMENDED:

- [1] PC AND CLONES Hardware, Troubleshooting and Maintenance B. Govinda rajalu, TataMc-graw-Hill Publication
- [2] PC Troubleshooting and Repair Stephen J. Bigelow Dream tech Press, New Delhi.
- [3] Windows XP Professional and Windows 7 Edition By BPB Publication.
- [4] Red Hat Linux By BPB & SYBEX publication.

List of Assignments:

1. To study motherboard.
2. Study of Processor.
3. To study SMPS and UPS.
4. To study the CD-ROM and DVD-ROM.
5. To study working of keyboard and mouse.
6. To study different ports and slots.
7. To study various types of Cables &Connectors.
8. Study of monitors.
9. To study different types of printers.
10. DOS Commands (Internal and External).
11. To study Floppy Disk Drive.
12. Installation of different Operating Systems.
13. Installation of different device drivers.
14. Installation of different Application Softwares.
15. Assembling and Disassembling of a Computer System.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SCR3S3 Environmental Studies	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	0	0	2	0	0	2

Learning Objectives: The Solving the e-Waste Problem (StEP) Initiative, an organization composed of various UN agencies, NGOs and companies working in the Information and Communication Technology Sector & to create understanding of Basel Ban form an effective and sustainable means of addressing the health and environmental problems caused by the export of e-waste from developed countries to developing nations

Pre requisites: Basic Knowledge about Electronic & Electrical components.

COURSE CONTENTS

UNIT-I

Introduction - What is & how is Electronic Waste generated, Toxins in E- waste , issues, Business Model, Basel Convention, Basel Ban.

UNIT-II

Classification of E-Waste - Composition of E-Waste, Components of E-Waste, Possible hazardous substances present in e-waste, E-waste scenario, Basis for Defining e-waste, Proposed definition of E-Waste, RoHS in the Electronic & electrical Equipments ,EPR.

UNIT-III

Legal Framework - The Hazardous Wastes (Management and Handling) Rules, The Municipal Solid Wastes (Management and Handling) Rules, Basel Convention, European Union policy and regulation on e-waste, US Policy for E-Waste

UNIT-IV

The Global Impact of E-waste - E-waste management in India, Global E-Waste Management, Analysis of systems and best practices

UNIT-V

Recycling From E-waste to Resources - Perspectives of WEEE/E-waste Management, Fundamentals Of E-Waste Recycling, Markets For Recycling Technology, Application Of A “technology Transfer Framework” For Selected Recycling Technologies, Innovation Hubs And Knowledge Centers Of Excellence In Emerging Economies

Learning Outcomes:

1. Students will have knowledge about controlling E-waste & business models available.
2. Students will have insight about recycling the E-waste.
3. Students will have information about the different authorized E-waste collectors and Government policies.

BOOKS RECOMMENDED:

- [1]Products From Waste (Industrial & Agro Waste) 2nd Edition
Author: NIIR Board ISBN: 818662337X
- [2]Modern Technology of Waste Management: Pollution Control, Recycling, Treatment & Utilization Author: NIIR board ISBN: 8178330849
- [3]The Complete Book on Managing Food Processing Industry Waste
Author: H. Panda ISBN: 9788178331454
- [4]The Complete Technology Book on E-Waste Recycling (Printed Circuit Board, LCD, Cell Phone, Battery, Computers) Author: NPCS Board of Consultants & Engineers ISBN: 9788178331577

ELECTRONICS AND INSTRUMENTATION ENGG. DEPARTMENT
SCHEME & SYLLABUS
IInd YEAR

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	AER3C1	APPLIED MATHEMATICS-III	PC	3-1-0	4
2	EIR3C2	DIGITAL ELECTRONICS	PC	3-1-1	4+1(P)
3	EIR3C3	DATA STRUCTURE	PC	3-1-1	4+1(P)
4	EIR3C4	NETWORK ANALYSIS	PC	3-1-1	4+1(P)
5	EIR3G1	ELECTRONIC DEVICES AND FABRICATION	GE	3-1-0	4
6	EIR3L1	ELECTRONIC WORKSHOP-I		0-0-1	1(P)
7	SIR3S3	EFFECTIVE COMMUNICATION SKILL		2-0-0	2
8	EIR3V3	COMPREHENSIVE VIVA - III	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
AER3C1 APPLIED MATHEMATICS-III	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objectives:

[8] To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like electromagnetic and electrostatic field theory, control theory, communication and signal processing, power transmission, design of discrete-(time) systems, circuit analysis etc.

[9] Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Prerequisites:

Basic knowledge of algebra of complex numbers, determinants, matrices, differentiation and integration of functions and probability theory.

COURSE CONTENTS

Unit-I

Function of Complex variables: Analytic functions, Cauchy's integral theorem and integral formulae, Taylor's and Laurent's series, Residue theorem, Solution of integrals.

Unit-II

Random variables, density function, stochastic process, autocorrelation, Markov chain, Multi-step in Markov chain. Basic concepts of reliability, failure laws, components in series and in parallel, Redundancy.

Unit-III

Interpolation: Finite difference operators, Newton's and Stirling's interpolation, Numerical differentiation, Numerical integration using Trapezoidal, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ and Weddle's rule.

Unit-IV

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-Falsi method, Newton-Raphson method. Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.

Numerical Solutions of differential equations - single and multi-step methods.

Unit-V

Fourier series, sine and cosine series, change of intervals, continuous-time and discrete-time Fourier series, Fourier Integral.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Apply the concept of complex analysis, Fourier analysis and stochastic process in various subjects of engineering like electromagnetic and electrostatic field theory, control theory, signal processing, and power transmission and so on.
2. Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.

BOOKS RECOMMENDED:

- [1] B.S.Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
- [2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
- [3] Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [4] Kasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
- [5] T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw - Hill Education, 2002.
- [6] K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, John Wiley & Sons, 2006.
- [7] G. Paria, Statistics and Stochastic Processes Part II, Scholar's Publication, Indore.
- [8] A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
- [9] Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3C2 DIGITAL ELECTRONICS	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide student knowledge of different number systems and conversion among them.
- Familiarize students with different logic families and characteristics of Digital IC's
- Familiarize students with different Combinational IC's.
- Develop skills to design various Combinational circuits
- Familiarize students with different Counter IC's
- Develop skills to design various Sequential circuits
- Develop ability to implement digital circuits in various practical applications.

Prerequisites: Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE CONTENTS

Unit –I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's-speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

Unit-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices

Unit-III

Combinational & Sequential Circuits: Combinational circuit design for Adder, Subtractor, Comparator, Multiplier, various Code converters Latches and Flip-Flops SR, D, T, JK, Master-slave, Flip- Flop conversions

Unit-IV

Counter and Registers: Synchronous counter, Asynchronous counter, Up-Down Counter, Shift Registers -serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register

Unit-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, DAC808 IC, Analog to Digital Conversions as Flash type, Counter type , Successive Approximations type A/D converter, Specifications of A/D converters, ADC 804 and 808 IC, Monostable, Bistable & Astable multivibrator using IC555.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Understand driving capacity of a gate and voltage-current parameters.
2. Implement digital circuit for arithmetic operations.
3. Implement digital circuit with optimize hardware.
4. Design and Analyse any combinational digital circuit
5. Design and Analyse any sequential circuit
6. Using analog to digital and digital to analog IC's for data conversion.
7. Design circuit to generate clock and pulses of desired frequency.

BOOKS RECOMMENDED:

- [1] Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
- [2] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
- [3] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [4] S Salivahan,S Arivazhagan "Digital Circuit and Design" Vikas Publication ,2013

List of Practical Assignments: During the learning of course, students need to do assignments:

1. To implement various gates using universal NAND/NOR IC's.
2. To Design and Implement various combinational circuits using gate IC's.
3. To Design and Implement various combinational circuits using Mux, D-Mux, Encoder, Decoder IC's.
4. To learn and analyze different Flip-Flops.
5. To Design and Implement various sequential circuits using Flip-Flop.
6. To learn and analyse Counter IC's.
7. To Design and Implement various sequential circuits.
8. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
9. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3C3 DATA STRUCTURE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Learning Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

Prerequisites: Computer Programming knowledge, C Language

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations: static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, Heap Sort, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem.

4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983.
- [2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
- [3] Kruz, Data Structure and Programming Design, 1987.
- [4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
- [5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & sons

List of Practical Assignments:

During the learning of course, students need to do assignments:

- 1. Implementation of searching and sorting techniques.
- 2. Implementation of list using array and linked list.
- 3. Implementation of push and pop operation on stack
- 4. Implementation of polish notation and its conversion
- 5. Write a program to solve the problems using iteration/recursion
- 6. Program for recursion removal using stack
- 7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
- 8. Program for storing data as tree structure and implementation of various traversal techniques
- 9. Program for storing data as graph structure and implementation of various traversal techniques
- 10. Program for finding shortest path in graph

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3C4	L	T	P	L	T	P	Total
NETWORK ANALYSIS	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To learn techniques of solving circuits involving different active and passive elements.
- To analyze the behavior of the circuit's response in time domain.
- To analyze the behavior of the circuit's response in frequency domain.
- To understand the significance of network functions.

Prerequisites: Basic course in Electrical

COURSE CONTENTS

UNIT-I

Circuit fundamental and tools of analyzing Network: Elements, Sources, their characteristics, source transformations, Kirchhoff's law, node and loop analysis, D-Y transformation, Network Theorems: Superposition, Reciprocity, Thevenin's, Norton's, Millman and Maximum Power Transfer Theorem, Coupled circuits, Graph Theory

UNIT-II

Time domain analysis of circuits: Transient and steady state analysis of first order and second order systems, initial and final conditions in networks, Solution of I, II and Higher order differential equation

UNIT-III

Two Port Networks: Various network parameters, two port parameters – z-parameter, y-parameter, transmission parameter and hybrid parameter, relationships, Interconnection of two-two port networks, terminated two port networks.

UNIT-IV

Laplace Transforms and Fourier analysis: Basic theorems for Laplace transform, solution of circuit problems using Laplace transform, Waveform synthesis, Theorem in transform domain, Fourier analysis of complex waves, symmetries, introduction to Fourier transforms.

UNIT-V

Network Synthesis: Network functions, significance of poles and zeros, Physical realizability condition, Hurwitz test, Synthesis of one port network, properties of LC immittances, foster realization of LC circuits, ladder development and Cauer forms, properties of RC immittances and synthesis of RC circuits.

Learning Outcomes:

Upon Completing the Course, Student will able to

1. Understand behavior of different circuits and their response using various circuit analysis tools and theorems
2. Understand the analysis in time domain and frequency domain.
3. Understand basic concepts regarding the system definition mathematically and associated network function.
4. Understand the concept of Network synthesis.

BOOKS RECOMMENDED:

- [1] M.E.Van Valkenburg, Network Analysis, 3/e, Pearson Education.
- [2] Franklin F.Kuo, Network Analysis and Synthesis, 2/e, John Wiley & Sons, 2003
- [3] Donald Scott, An Introduction to Circuit Analysis: A System Approaches, Electrical Engineering Series, McGraw-Hill International Editions., 1987
- [4] T.S.K.V. Iyer, Theory and Problem in Circuit Analysis, TMH Outline Series, Tata McGraw-Hill Publishing Company Ltd, New Delhi., 2000
- [5] Gyanendra K.Mithal & Ravi Mithal, Network Analysis including Transmission Line, 14/e, Khanna Publishers, New Delhi., 2001

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Introduction to various components used in circuit analysis laboratory.
2. Experimental verification of Kirchoff's voltage law and Kirchoff's current law.
3. Experimental verification of Thevenin's theorem.
4. Experimental verification of Norton's theorem.
5. Experimental verification of Superposition theorem.
6. Experimental verification of Maximum Power transfer theorem.
7. Experimental verification of Reciprocity theorem.
8. Calculation of z-parameters for a two port network.
9. Calculation of y-parameters for a two port network.
10. Calculation of ABCD-parameters for a two port network.
11. Experimental verification for series and parallel interconnection of a two port network.
12. Transient response analysis of a first order and second order circuit.
13. Experimental verification for Fourier series.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3G1 ELECTRONIC DEVICES AND FABRICATION	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize the student with the principle of operation, analysis and design of Junction diode, BJT amplifier circuits, and transistors.
- To understand basic fabrication steps of semiconductor device manufacturing.
- To study basic principle of filter circuits and various types

Prerequisites: Basic Electronics

COURSE CONTENTS

Unit I

Foundation: The Semiconductor in Equilibrium: Statistical Mechanics, Charge Carriers in Semiconductor, Dopant Atoms and Energy Levels, The Extrinsic Semiconductor, Statistic of Donors and Accepters, Charge Neutrality, Position of Fermi Energy Level.

Unit II

Carrier Transport Phenomena: Carrier Drift, Drift Current Density, Mobility Effect, Conductivity, Velocity Saturation, Diffusion Current Density, Total current density, Carrier Generation and Recombination, Quasi Fermi Level, Excess Carrier Life time.

Unit III

PN Junction: Basic Structure of PN Junction, PN Junction under Zero Bias, Built in Potential barriers, Electric Field, Space Charge Width, PN Junction Under Forward and reverse Bias, minority and majority carrier distribution, Space charge width and electric field in forward and reverse bias, Junction Capacitances, one sided Junctions, Junction breakdowns. PN Junction Current, Small Signal Model of PN Junction.

Unit IV

The Bipolar transistor: Bipolar principal of operation, the modes of operation, Minority carrier distribution, Low frequency Common Base Current Gain, nonideal effects, equivalent circuit models, Frequency Limitations, Current voltage characteristics, BJT as an Amplifier, Small Signal Operation and Models.

Unit V

Single Crystal Structure, Defects in silicon structure, specification of silicon wafer, Crystal growth, CZ method, Oxidation, Diffusion, Ion Implantation, Metallization, Lithography, Process steps for PN Junction Diode, BJT fabrication.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Acquire Knowledge and understanding of Electronics Devices and its operation.
2. Apply acquired knowledge in designing state of art circuits.
3. Able to know the manufacturing steps for Electronics devices

BOOKS RECOMMENDED:

- [1].Donald Neamen and Dhruves Biswas, Semiconductor Physics and Devices, Mc graw Hill Education, Gouranga Bose, “IC Fabrication Technology”, Mc Graw Hill Education, Edition 2014.
- [2] Adel S Sedra and Kenneth C. Smith, “Microelectronics Circuits Theory and Application”, Oxford, Edition Sixth.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3L1 ELECTRONIC WORKSHOP-I	L	T	P	L	T	P	Total
		0	0	1	0	0	1
Duration of Theory Paper:							

Learning Objectives:

This course gives the basic introduction of electronic hardware systems and provides hands-on training with familiarization, identification, testing, assembling, dismantling, fabrication and repairing such systems by making use of the various tools and instruments available in the Electronics Workshop.

List of Exercises / Experiments (Minimum of 8 mandatory)

1. Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.]
2. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools,
3. Interpret data sheets of discrete components and IC's, Estimation and costing.
4. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.]
5. Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.]
6. Inter-connection methods and soldering practice. [Bread board, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
7. Printed circuit boards (PCB) [Types, Single sided, Double sided, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
8. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (**Any Four circuits**)
 - A. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.
 - LED blinking circuit using a stable multi-vibrator with transistor BC 107.
 - Square wave generation using IC 555 timer in IC base.
 - Sine wave generation using IC 741 OP-AMP in IC base.
 - RC coupled amplifier with transistor BC 107.

Learning Outcomes:

Student can identify the active and passive electronic components. Student gets hands-on assembling, testing, assembling, dismantling, fabrication and repairing systems by making use of the various tools and instruments available in the Electronics Workshop.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SIR3S3 EFFECTIVE COMMUNICATION SKILL	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisites: Technical English

COURSE CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Types of Communication; Art of Communication.

Unit-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts.; Telephone speaking skills and Cross-cultural communication skills

Unit-III

Fundamentals of public Speaking- Speeches on topics of current concern ,listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

Unit-IV

Interviews: Points to be remembered as an interviewer or an interviewee; Commonly asked questions; Types of interviews; Do's and Don'ts.

Unit-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the

Audience; Nonverbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Note: *There shall be seminars and practice sessions by students.*

Learning Outcomes:

Upon Completing the Course, Student will able to deliver the *seminars and making presentation*.

BOOKS RECOMMENDED:

- [1] P D Chaturvedi, P.D. & M Chaturvedi, *Business Communication: Concepts, Cases and Applications*, PearsonEducation, Singapore Pvt. Ltd, 2004.
- [2] ICMR, *Business Communication*, Feb 2001.
- [3] J Davies, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education,2006.
- [4] Lecture material given by the course teacher.

INFORMATION TECHNOLOGY DEPARTMENT
SCHEME & SYLLABUS
II YEAR

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	AIR3C1	Discrete Mathematics	PC	3-1-0	4
2.	ITR3C2	Object Oriented Programming	PC	3-1-1	4+1(P)
3.	ITR3C3	Data Structures	PC	3-1-1	4+1(P)
4.	ITR3C4	Digital Electronics	PC	3-1-1	4+1(P)
5.	ITR3G1	Computer Organization & Architecture	GE	3-1-0	4
6.	ITR3L1	Computer Hardware Lab	--	0-0-1	1
7.	SIR3S3	Life Management Skills	--	2-0-0	2
8.	ITR3V3	Comprehensive Viva - III	Virtual	0-0-4	4
Total Credits					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (INFORMATION TECHNOLOGY)				
Subject Code & Name	Instructions Hours per Week			Credits			
AIR3C1 Discrete Mathematics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objectives:

- To introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science.
- Provide the fundamentals of formal techniques for solving the problems in mathematical reasoning, combinatorial analysis, discrete structures, algorithmic thinking, and applications and modelling.

Prerequisites: Nil.

COURSE CONTENTS

Unit-I

Sets: Algebra of sets, laws of sets, computer representation, cardinality of a set, principle of inclusion-exclusion.

Functions: Characteristic function of a set, floor and ceiling functions, mod function, hashing function. **Relations:** Binary Relation, properties, closure of a relation, equivalence and partial order relations, partially ordered set, Hasse Diagram, totally ordered set, maximal and minimal elements, upper bound, lower bound, greatest lower bound and least upper bound, lattice, sub lattice, properties of lattices, distributive lattices, complemented lattices, modular lattices, topological sorting.

Unit-II

Propositional Logic: Proposition, logical connectives, bit operations, conditional and bi-conditional propositions, logical equivalence, algebra of propositions, tautology, contradiction and contingency, normal forms, logic in proof, predicates and quantifiers, rules of inferences, Applications of propositional logic to logic puzzles, Boolean searches, logic circuits and system specifications.

Unit-III

Mathematical Induction: Strong induction, well-ordering, Recursive definitions.

Advanced Counting techniques: Pigeon-hole principle, sequences and summations, generating functions.

Recurrence relations: -Formation, methods of solution and application.

Unit-IV

Graph Theory: Terminology, graph representation-incidence and adjacency matrices, walk, path, cycle, graph isomorphism, connectedness, Euler & Hamiltonian graphs, planar graph, graph coloring, shortest paths algorithms.

Trees: Terminology, spanning trees, minimum spanning trees, tree traversals; prefix codes.

Unit-V

Binary operation, groupoid, semi group, monoid, group, subgroup, cyclic group, permutation group, definition and examples of Rings, Integral domain and Fields; Application to coding theory.

Boolean Algebra-Definition, laws of Boolean algebra, Boolean functions, sum of products and product of sum form, normal form, simplification of Boolean function by algebraic method, Boolean expression for logic and switching network, Karnaugh Map Method for simplification of Boolean expressions.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Learn a particular set of mathematical facts and know how to apply them.
2. Think logically and mathematically.
3. Use and analyze recursive definitions.
4. How to count some different types of discrete structures.
5. Techniques for constructing mathematical proofs and to reason about the efficiency of an algorithm.

Books Recommended:

- [1] Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Edition 2007.
- [2] Kolman, Busby & Ross, Discrete Mathematical Structures, 6th edition, Pearson Education, 2008.
- [3] C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
- [4] Trembley and Manohar, Discrete Mathematical structures for Computer Science, McGraw Hill, 1986.
- [5] Edgar G. Goodaire, Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd edition Prentice Hall, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (INFORMATION TECHNOLOGY)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3C2 OBJECT ORIENTED PROGRAMMING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the knowledge of Object Oriented Programming Paradigm.
- To learn basic constructs of programming language that are implementing tools for object oriented program development.
- To develop skill to analyze and code for problem solution in object oriented approach.

Pre-requisites: Computer Programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming: Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT-II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

UNIT-III

Inheritance and Polymorphism : Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and Packages.

UNIT-IV

Exception Handling and Multithreading: Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating custom exceptions. Multithreading: Introduction, Priorities and scheduling, Inter-thread communication, Thread Synchronization and its life cycle.

UNIT-V

Java I/O, Applets and Event Handling: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Analyze and code the solution to problem using object oriented paradigm.
2. Understand Java language constructs.
3. Apply object model for software development

BOOKS RECOMMENDED:

- [1] Cay S.Horstmann, *Core JAVA Vol-1*, 9/e, Pearson Education 2012.
- [2] Herbert Schildt, *The complete Reference*, 9/e, Tata McGraw Hill 2014.
- [3] Scott W Amber, *The Object Primer*, 3/e, Cambridge 2004.
- [4] Timothy Budd, *Object Oriented Programming*, 3/e, Pearson Education 2002.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2/e , Oreilly Publications 2005.

List of Practical Assignment:

1. Experiments to understand program development environment for Java language.
2. Writing program to learn basic language constructs like identifier, variables, data types and console input/output..
3. Writing program to learn control statements.
4. Writing program to use class and objects to model problem domain entity in program domain.
5. Writing program to use inheritance and polymorphism features.
6. Programs to use exception and understanding modeling errant condition in execution as class and objects.
7. Experiments to learn Multi-Thread execution.
8. Writing program to code applications needing concurrency and exploring inter-thread communication mechanism.
9. Experiments to understand stream concept and study various stream abstractions and implementation available in the language
- 10.Exploring GUI components and understanding Event Delegation Model. Understanding (GUI) objects and their communication based program to realize object oriented programming in action.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3C3 DATA STRUCTURES	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

Prerequisites : Computer Programming knowledge

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations : static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, Heap Sort, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Learning Outcomes :

Upon Completing the Course, Student will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem..
4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983.
- [2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
- [3] Kruz, Data Structure and Programming Design, 1987.
- [4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
- [5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph.
11. Learn use of suitable data structures for solving problems: Maze, Polynomial Arithmetic, Tower of Hanoi etc.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Technology)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3C4 Digital Electronics	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To provide knowledge of different data representation systems for digital computers.
- Familiarize students with different hardware implementation techniques of different logic functions.
- Develop skills to design and implement various combinational and sequential circuits
- Develop ability to implement digital circuits in various practical applications.
- Provide knowledge of data converters and basic understanding of Microprocessors

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL &MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's-speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

UNIT-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices, Combinational circuit design for Adder, Subtractor, Comparator, Code converters

UNIT-III

Sequential Circuits: Latches and Flip-Flops SR, D, T, JK, Master-slave , Flip- Flop conversions, Synchronous counter, Asynchronous counter, Up-Down Counter

UNIT-IV

Registers: Shift Registers, serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register, Sequence Generators, Designing of Synchronous & Asynchronous sequential circuits.

UNIT-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, Conversions as Flash type, Counter type, Successive Approximations type A/D converter, Clock generation through IC555, Memory- Types ROM, RAM, Introduction to Microprocessor, Microprocessor Evaluation, Programming and hardware model of Microprocessor, 8/16/32/64 bit Series of Microprocessors.

Learning Outcomes :

Upon completing the course, students will be able to Understand how to represent data in digital form.

- Understand driving capacity of a gate and voltage-current parameters Design and Analyse any combinational and sequential digital circuit Using analog to digital and digital to analog IC's for data conversion. Understand basics of microprocessors

BOOKS RECOMMENDED:

- [1] Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
- [2] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition, Prentice-Hall of India Private Limited, New Delhi., 2001
- [3] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [4] S Salivahan, S Arivazhagan "Digital Circuit and Design" Vikas Publication
- [5] Ramesh S. Gaonkar, Microprocessor, Architecture, Programming, and Applications with the 8085, Penram International Publication.

List of Practical Assignment:

During the learning of course, students need to do assignments:

1. To Implement various gates using universal NAND/NOR IC's.
2. To Design and Implement various combinational circuits using gate IC's.
3. To Design and Implement various combinational circuits using Mux, D Mux, Encoder, Decoder IC's. To learn and analyze different Flip-Flops.
4. To Design and Implement various sequential circuits using Flip-Flop.
5. To learn and analyse Counter IC's.
6. To Design and Implement various sequential circuits.
7. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
8. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR3G1 Computer Organization & Architecture	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide a framework for understanding the fundamentals of computing.
- To familiarize students with relationship between hardware and software to focus on the concepts that are the basis for current computers.
- Develop skills to understand how to design a computer
- Develop ability to understand how to enhance performance of a computer system.

Prerequisites: Knowledge of Digital Electronics and Computer Programming.

COURSE CONTENTS

Unit-I

Introduction: Difference Between Computer Organization and Computer Architecture, computer Types, Flynn's Classification, Functional Units, Basic Operational Concepts: Bus Structures, Software; Performance: Processor Clock, Basic Performance Equation, Clock Rate, Compiler, Performance Measurement; multiprocessors and Multicomputers, Historical Perspective: Generation of computer, Evolution of Performance; Arithmetic for Computers: Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Booth Algorithm, Floating Point Arithmetic: Addition and Multiplication.

Unit-II

Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory; Memory Speed, Size and Cost Considerations; Cache Memories: Mapping Functions, Replacement Algorithms, Performance Considerations, Hit Rate and Miss Penalty, Caches on the Processor Chip; Virtual Memories: Address Translation; Memory Management Requirements.

Unit-III

Processing Unit: Addressing Modes, Connections between the Processor and the Memory, Processor Activity, Instruction cycle, John Von Neumann Architecture, State Machine Concept, Processor as a State Machine, Data Path Architecture, Data Path Controller: Microprogrammed; Hardwired Design, Firmware Design, Microcontroller Design, Design of Flip-Flop to understand the Design of CPU.

Unit-IV

Input Output Organization: I/O Devices: Introduction, Typical Collection, Diversity; Dependability, Reliability, Availability, Disk Storage, Flash Storage, Connecting Processor Memory and I/O Devices, Connection Basics, Interfacing I/O Devices to the Processor Memory and Operating System: Giving Commands to I/O Devices, Communicating with the Processor, Interrupt Priority Levels, Transferring the Data between a Device and Memory, Direct Memory Access and the Memory System; I/O Performance Measures, Impact of I/O on System Performance.

Unit-V

Pipelining & Multiprocessors: Principles of Pipelining, Principles of Linear Pipelining, Clock Period, Speedup, Efficiency, Throughput, Classification of Pipeline Processor, General Pipelines and Reservation Tables, Collision Vector, State Diagram for a Pipeline, Pipeline Hazards, Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors, Introduction to Graphics Processing Units, Introduction to Multiprocessor Network Topologies.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Acquire advance knowledge and understanding of computing.
2. Use skills in computer design.
3. Apply acquired knowledge to improve performance of a computer.
4. In addition to development in technology student will be able to innovate in the architecture of computers, such as the use of caches and pipelining.

Books Recommended:

- [1] Computer Organization, 5th Ed., C. Hamacher, Z. Vranesic, S. Zaky, McGraw Hill International Edition 2002.
- [2] Computer Organization and Design, 5th Ed. ,David A. Patterson, John L. Hennessy, The hardware/software interface, Morgan Kaufmann Publisher, 2014.
- [3] Patterson & Hennessy, Computer Organization and Design, Morgan Kaufmann Publisher, 2007.
- [4] Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Briggs, McGraw Hill Education, 2012.

List of Assignments (Theory): During the learning of course, students need to do assignments:

1. Performance measurement of a Computer.
2. Arithmetic for Computers.
3. Cache Hit Rate/Miss Penalty issues.
4. Virtual Memory : Address Translation.
5. Use of Addressing Modes.
6. Study on designs of CPU.
7. Secondary storage performance.
8. Impact of I/O on system performance.
9. Pipelining performance.
10. Multi-core, GPU Processor and Multiprocessor : A Comparison.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E.(Information Technology) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3L1	L	T	P	L	T	P	Total
Computer Hardware Lab	0	0	2	0	0	1	1

Learning Objectives:

- To provide the knowledge of computer Hardware parts and latest technology.
- To give basic Knowledge of working internal part of system.
- To develop skill to analyze and find the fault in System.
- To know how to assembling the hardware parts.

Pre requisites: Not Required.

COURSE CONTENTS

UNIT-I

CPC Processor

Basics of Processor and Computer Generation, Study of Different Processor, Pentium, Dual Core , Quad Core , I3, I5, I7 Processor, Motherboards, Chipset and Controllers, BIOS and the Boot Process.

UNIT-II

Internal Components

IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Internal Ports, Cables and Connector Types, SMPS.

UNIT-III

Computer Peripherals

Monitors:- CRT, LCD and LED Displays, Printers:- Dot-Matrix Printer, Inkjet Printer, Laser Printer Scanner:- Photo Scanner, Documents Scanner, Bar Cord Scanner, Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.

UNIT-IV

Memory and Networking Devices

Computer memory: Primary Memory- RAM, ROM, Secondary memory, Switches, Routers, Modems.

UNIT-V

Assembling and Operating System Installation

Assembled the Hardware Parts, Different types of Operating systems, System files FAT and NTFS, Dos , Windows XP, Windows Vista, Windows 7 and Windows 8 and Red Hat Linux and Multi Boot Operating System and latest OS.

Learning Outcomes:

Upon Completing the Course, Student will able to: learn the knowledge of hardware parts and Assemble a computer System and Installation & Uninstallation of Software.

BOOKS RECOMMENDED:

- [1] PC AND CLONES Hardware, Troubleshooting and Maintenance B. Govinda rajalu, Tata Mc-graw-Hill Publication
- [2] PC Troubleshooting and Repair Stephen J. Bigelow Dream tech Press, New Delhi.
- [3] Windows XP Professional and Windows 7 Edition By BPB Publication.
- [4] Red Hat Linux By BPB & SYBEX publication.

List of Practical Assignment:

1. To study motherboard.
2. Study of Processor.
3. To study SMPS and UPS.
4. To study the CD-ROM and DVD-ROM.
5. To study working of keyboard and mouse.
6. To study different ports and slots.
7. To study various types of Cables & Connectors.
8. Study of monitor.
9. To study different types of printers.
10. To Run All Dos Command (Internal and External Dos Command)
11. To study Floppy Disk Drive.
12. Installation of different Operating Systems
13. Installation of different device drivers
14. Installation of different Application Software
15. Assembling and Disassembling of a Computer System.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SIR3S3 Life Management Skills	2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To provide an overview on Life Skills Management
- To make students able to understand themselves and their Role in Society To develop Healthy Personality
- To align them as complete self: Mind, Body and Soul

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Basics of Life Skills Management: Understanding Self and Psychological Problems

Life Skills Management: Concepts and Applications, Basics of Brain-Structure, Hormones: Role of Hormones in changing mood and emotions, Role of genes, Understanding Memory.

Normal Self: Concept of Normality. Characteristics of Healthy Personality, Levels of Personality Dysfunctions, Ways to offset depression. Anxiety: Symptoms and Dealing with anxiety. Managing Anger, and Right attitude towards competition. Understanding the reasons behind OCD and.

Unit-II

Managing Habits: Neurology of Habits, Developing Discipline in creating new habits, will-power, Causes of Addictions, Changing destructive habits, Habits of highly effective people. Relaxation Techniques: Meditation, Effects of Meditation. Positive Attitude towards oneself, Equanimity in oneself, Happiness – a state of mind and related techniques.

Unit-III

Relationship Management: Emotional Intelligence: Core Domain: Self Awareness, Self Regulation, Social Awareness and Relationship Management. Relationship Management: Four Criteria for Effective Relationship Management, Competencies in the Relationship Management.

Ability to size-up situations, Role of Empathy Basics of Interpersonal Communication: Understanding and Observing Non-Verbal Behavior, Listening skills. Profiling Personal Environments. Understanding the types of Personality & their Motivating-Factors. Concepts of healthy relationships.

Unit-IV

Stress Management : Understanding the Physiology of Stress, Symptoms of Stress. Stress and Performance, effects of Stress on Learning, Oversensitivity, Focus and Concentration, Techniques of Stress Management. Concepts of Crisis Management, Dealing with Peer Pressure and Complexes, Assertiveness Training, Avoiding Groupthink, Dealing with distractions.

Unit-V

Mental Health and Wellness : Concept of Wellness: Measures to improve Wellness. Sleeping and Mind, Yoga and Exercise, Concepts of Balanced Diet, Importance of Recreational Practice, Role of art in wellness, How imagination shapes our Mind-Set. Wellness Programs for Professionals.

Learning Outcomes :

Upon completing the course, students will be able to:

- Handle stressful situation understand their priorities
- Cope with different psychological problems
- Find real happiness

ELECTRONICS & TELECOMMUNICATION ENGINEERING DEPARTMENT
SCHEME & SYLLABUS
IIInd YEAR

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	ATR3C1	APPLIED MATHEMATICS-III	PC	3-1-0	4
2	ETR3C2	DIGITAL ELECTRONICS	PC	3-1-1	4+1(P)
3	ETR3C3	DATA STRUCTURE	PC	3-1-1	4+1(P)
4	ETR3C4	NETWORK ANALYSIS	PC	3-1-1	4+1(P)
5	ETR3G1	ELCTRONIC DEVICES AND FABRICATION	GE	3-1-0	4
6	ETR3L1	ELECTRONIC WORKSHOP-I		0-0-1	1(P)
7	STR3S3	EFFECTIVE COMMUNICATION SKILL		2-0-0	2
8	ETR3V3	COMREHENSIVE VIVA -III	VIRTUAL	0-0-4	4
				TOTAL CREDITS	30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ATR3C1 APPLIED MATHEMATICS-III	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like electromagnetic and electrostatic field theory, control theory, communication and signal processing, power transmission, design of discrete times systems, circuit analysis etc.
- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Prerequisites:

Basic knowledge of algebra of complex numbers, determinants, matrices, differentiation and integration of functions and probability theory.

COURSE CONTENTS

Unit-I

Function of Complex variables: Analytic functions, Cauchy's integral theorem and integral formulae, Taylor's and Laurent' series, Residue theorem, Solution of integrals.

Unit-II

Random variables, density function, stochastic process, autocorrelation, Markov chain, Multi-step in Markov chain. Basic concepts of reliability, failure laws, components in series and in parallel, Redundancy.

Unit-III

Interpolation: Finite difference operators, Newton's and Stirling's interpolation, Numerical differentiation, Numerical integration using Trapezoidal, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ and Weddle's rule.

Unit-IV

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-Falsi method, Newton-Raphson method. Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.

Numerical Solutions of differential equations - single and multi-step methods.

Unit-V

Fourier series, sine and cosine series, change of intervals, continuous-time and discrete-time Fourier series, Fourier Integral.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Apply the concept of complex analysis, Fourier analysis and stochastic process in various subjects of engineering like electromagnetic and electrostatic field theory, control theory, signal processing, and power transmission.
2. Learn that many problems where analytical methods seem to fail like solving highly nonlinear equation.

BOOKS RECOMMENDED:

- [1]. B.S.Grewal, "*Engineering Mathematics*", Khanna Publishers, 42/e, 2015.
- [2]. Erwin. Kreyszig, "*Advanced Engineering Mathematics*", 8th edition, John Wiley and sons Publications, 1999.
- [3]. Gupta P.P. & Malik G.S., "*Calculus of Finite Differences and Numerical Analysis*", Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [4]. Kasana H.S., "*Complex Variables: Theory and Applications*", Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
- [5]. T. Veerarajan, "*Probability, Statistics and Random Processes*", Tata McGraw - Hill Education, 2002.
- [6]. K. S. Trivedi, "*Probability and Statistics with Reliability, Queuing, and Computer Science Applications*", John Wiley & Sons, 2006.
- [7]. G. Paria, "*Statistics and Stochastic Processes Part II*", Scholar's Publication, Indore.
- [8]. A.R. Vasishtha and R.K. Gupta, "*Integral Transforms*", Krishna Prakashan Media Ltd, Meerut, India, 2000.
- [9]. Murray R. Spiegel, "*Schaum's Outline of Fourier Analysis*", McGraw-Hill, New York, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C2 DIGITAL ELECTRONICS	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide student the knowledge of different number systems and conversion among them.
- Familiarize students with different logic families and characteristics of Digital ICs
- Familiarize students with different Combinational ICs.
- Develop skills to design various Combinational circuits
- Familiarize students with different Counter ICs
- Develop skills to design various Sequential circuits
- Develop ability to implement digital circuits in various practical applications.

Prerequisites:

Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE CONTENTS

Unit –I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's- speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

Unit-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices

Unit-III

Combinational & Sequential Circuits: Combinational circuit design for Adder, Subtractor, Comparator, Multiplier , various Code converters
Latches and Flip-Flop- SR, D, T, JK, Master-slave , Flip- Flop conversions.

Unit-IV

Counter and Registers: Synchronous counter, Asynchronous counter, Up-Down Counter, Shift

Registers -serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register

Unit-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, DAC808 IC Analog to Digital Conversions as Flash type, Counter type, Successive Approximations type A/D converter, Specifications of A/D converters, ADC 804 and 808 IC, Schmitt trigger, Monostable & Astable Multivibrator using IC555.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Understand driving capacity of a gate and voltage-current parameters.
2. Implement digital circuit for arithmetic operations.
3. Implement digital circuit with optimized hardware.
4. Design and Analyse any combinational digital circuit
5. Design and Analyse any sequential circuit
6. Using analog to digital and digital to analog IC's for data conversion.
7. Design circuit to generate clock and pulses of desired frequency.

BOOKS RECOMMENDED:

- [1] Mano M. Morris, "*Digital Design*", 3rd edition, Pearson Education 2006.
[2] William H.Gothmann,"*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
[3] William I. Fletcher, "*An Engineering Approach to Digital Design*", Pearson Education
[4] S Salivahan,S Arivazhagan "*Digital Circuit and Design*" Vikas Publication ,2013

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. To implement various gates using universal NAND/NOR ICs.
2. To Design and Implement various combinational circuits using gate ICs.
3. To Design and Implement various combinational circuits using Mux, D-Mux, Encoder, Decoder ICs.
4. To learn and analyze different Flip-Flops.
5. To Design and Implement various sequential circuits using Flip-Flop.
6. To learn and analyse Counter IC's.
7. To Design and Implement various sequential circuits.
8. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
9. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C3 DATA STRUCTURE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Learning Objectives:

- [1]To provide the knowledge of basic data structures and their implementations.
- [2]To understand importance of data structures in context of writing efficient programs.
- [3]To develop skills to apply appropriate data structures in problem solving.

Prerequisites:

Computer Programming knowledge, C Language

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations: static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, Heap Sort, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem.
4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, " *Fundamental Data Structure*", Galgotia Book Source, 1983.
- [2] A. Tannenbaum, " *Data Structure Using C*", Pearson Education, 2003.
- [3] Kruse, " *Data Structure and Programming Design*", Prentice Hall, 1987.
- [4] N. Wirth, " *Algorithms + Data Structure = Program*", Prentice Hall of India, 1979.
- [5] Goodrich & Tamassia, " *Data Structures and Algorithms in C++*", 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

During the learning of course, students need to carry out following assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queues & implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C4 NETWORK ANALYSIS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Learning Objectives:

- To learn techniques of solving circuits involving different active and passive elements.
- To analyze the behavior of the circuit's response in time domain.
- To analyze the behavior of the circuit's response in frequency domain.
- To understand the significance of network functions.

Prerequisites: Basic course in Electrical Engineering.

COURSE CONTENTS

UNIT-I

Circuit fundamental and tools of analyzing Network: Elements, Sources, their characteristics, source transformations, Kirchhoff's law, node and loop analysis, D-Y transformation, Network Theorems: Superposition, Reciprocity, Thevenin's, Norton's, Millman and Maximum Power Transfer Theorem, Coupled circuits, Graph Theory

UNIT-II

Time domain analysis of circuits: Transient and steady state analysis of first order and second order systems, initial and final conditions in networks, Solution of I, II and Higher order differential equation

UNIT-III

Two Port Networks: Various network parameters, two port parameters – z-parameter, y-parameter, transmission parameter and hybrid parameter, relationships, Interconnection of two-port networks, terminated two port network.

UNIT-IV

Laplace Transform and Fourier analysis: Basic theorems for Laplace transform, solution of circuit problems using Laplace transform, Waveform synthesis, Theorem in transform domain, Fourier analysis of complex waves, symmetries, introduction to Fourier transform.

UNIT-V

Network Synthesis: Network functions, significance of poles and zeros, Physical realizability condition, Hurwitz test, Synthesis of one port network, properties of LC immittance, foster realization of LC circuits, ladder development and Causer forms, properties of RC immittance and synthesis of RC circuits.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. Understand the behavior of different circuits and their response using various circuit analysis tools and theorems
2. Understand the analysis in time domain and frequency domain.
3. Understand basic concepts regarding the system definition mathematically and associated network function.
4. Understand the concept of Network synthesis.

BOOKS RECOMMENDED:

- [1] M.E.Van Valkenburg, “*Network Analysis*”, 3/e, Pearson Education.
- [2] Franklin F.Kuo, “*Network Analysis and Synthesis*”, 2/e, John Wiley & Sons, 2003
- [3] Donald Scott, “*An Introduction to Circuit Analysis: A System Approaches*, Electrical Engineering Series”, McGraw-Hill International Editions. 1987
- [4] T.S.K.V. Iyer, “*Theory and Problem in Circuit Analysis*”, TMH Outline Series, Tata McGraw-Hill Publishing Company Ltd, New Delhi. 2000
- [5] Gyanendra K.Mithal & Ravi Mithal, “*Network Analysis including Transmission Line*”, 14/e, Khanna Publishers, New Delhi., 2001

List of Practical Assignments:

During the learning of course, students need to do following assignments:

1. Introduction to various components used in circuit analysis laboratory.
2. Experimental verification of Kirchoff’s voltage law and Kirchoff’s current law.
3. Experimental verification of Thevenin’s theorem.
4. Experimental verification of Nortan’s theorem.
5. Experimental verification of Superposition theorem.
6. Experimental verification of Maximum Power transfer theorem.
7. Experimental verification of Reciprocity theorem.
8. Calculation of z-parameters for a two port network.
9. Calculation of y-parameters for a two port network.
10. Calculation of ABCD-parameters for a two port network.
11. Experimental verification for series and parallel interconnection of a two port network.
12. Transient response analysis of a first order and second order circuit.
13. Experimental verification for Fourier series.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3G1 ELECTRONIC DEVICES AND FABRICATION	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize the student with the principle of operation, analysis and design of Junction diode, Transistors and BJT amplifier circuits
- To understand the basic fabrication steps of semiconductor device manufacturing.
- To study basic principle of filter circuits.

Prerequisites:

Basic Electronics

COURSE CONTENTS

Unit I

Foundation: The Semiconductor in Equilibrium: Statistical Mechanics, Charge Carriers in Semiconductor, Dopant Atoms and Energy Levels, The Extrinsic Semiconductor, Statistic of Donors and Accepters, Charge Neutrality, Position of Fermi Energy Level.

Unit II

Carrier Transport Phenomena: Carrier Drift, Drift Current Density, Mobility Effect, Conductivity, Velocity Saturation, Diffusion Current Density, Total current density, Carrier Generation and Recombination, Quasi Fermi Level, Excess Carrier Life time.

Unit III

PN Junction: Basic Structure of PN Junction, PN Junction under Zero Bias, Built in Potential barriers, Electric Field, Space Charge Width, PN Junction Under Forward and reverse Bias, minority and majority carrier distribution, Space charge width and electric field in forward and reverse bias, Junction Capacitances, one sided Junctions, Junction breakdowns. PN Junction Current, Small Signal Model of PN Junction.

Unit IV

The Bipolar transistor: Bipolar principal of operation, the modes of operation, Minority carrier distribution, Low frequency Common Base Current Gain, nonideal effects, equivalent circuit models, Frequency Limitations, Current voltage characteristics, BJT as an Amplifier, Small Signal Operation and Models.

Unit V

Single Crystal Structure, Defects in silicon structure, specification of silicon wafer, Crystal growth, CZ method, Oxidation, Diffusion, Ion Implantation, Metallization, Lithography, Process steps for PN Junction Diode, BJT fabrication.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. Acquire Knowledge and understanding of Electronics Devices and its operation.
2. Apply acquired knowledge in designing state of art circuits.
3. Able to know the manufacturing steps for Electronics devices

BOOKS RECOMMENDED:

- [1]. Donald Neamen and Dhruves Biswas, “*Semiconductor Physics and Devices*”, Mc graw Hill Education, 4e.
- [2]. Gouranga Bose, “*IC Fabrication Technology*”, Mc Graw Hill Education, Edition 2014.
- [3]. Adel S Sedra and Kenneth C. Smith, “*Microelectronics Circuits Theory and Application*”, Oxford, Edition Sixth.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3L1 ELECTRONIC WORKSHOP-I	L	T	P	L	T	P	Total
Duration of Theory Paper:	0	0	1	0	0	1	1

Learning Objectives:

This course gives the basic introduction of electronic hardware systems and provides hands-on training with familiarization, identification, testing, assembling, dismantling, fabrication and repairing such systems by making use of the various tools and instruments available in the Electronics Workshop.

Prerequisites:

None

COURSE CONTENTS

List Experiments

1. Familiarization/Identification of electronic components with specification: Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.
2. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpretation of data sheets of discrete components and ICs, Estimation and costing.
3. Familiarization/Application of testing instruments and commonly used tools : Multimeter, Function generator, Power supply, CRO etc. , Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.
4. Testing of electronic components: Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.
5. Inter-connection methods and soldering practice. : Bread board, Soldering - types - selection of materials and safety precautions, soldering practices in connectors and general purpose PCB, Crimping.
6. Printed circuit boards (PCB) : Types, Single sided, Double sided, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching using Ferric chloride and drilling.

7. Assembling of electronic circuit/system on general purpose PCB, test and demonstration of functioning (**Any Four circuits**)
- A. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, Zener/IC regulator.
 - B. LED blinking circuit using a stable multi-vibrator with transistor BC 107.
 - C. Square wave generation using IC 555 timer.
 - D. Sine wave generation using IC 741 OP-AMP.
 - E. RC coupled amplifier with transistor BC 107.

Learning Outcomes:

Student can identify the active and passive electronic components. Student gets hands-on experience on assembling, testing, dismantling, fabrication and repairing systems by making use of the various tools and instruments available in the Electronics Workshop.

BOOKS RECOMMENDED:

[1] R S Khandpur, "*Printed Circuit Boards - Design Fabrication, Assembly and Testing*", Tata Mc Graw Hill Publishing Company Limited, 1st edition 2008.

[2] Horowitz and Hill, "*The Art of Electronics 2nd Edition*", 1989/1990 Cambridge University Press

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
STR3S3 EFFECTIVE COMMUNICATION SKILL	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisites: Technical English

COURSE CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Types of Communication; Art of Communication.

Unit-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts.; Telephone speaking skills and Cross-cultural communication skills

Unit-III

Fundamentals of public Speaking- Speeches on topics of current concern ,listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

Unit-IV

Interviews: Points to be remembered as an interviewer or an interviewee; commonly asked questions; Types of interviews; Do's and Don'ts.

Unit-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Nonverbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Note: There shall be seminars and practice sessions by students.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Enhance the competency for Group discussion and Personal interviews.
2. Prepare for GRE, GATE, and TOEFL etc.
3. Develop their syntax, vocabulary and expression power.
4. Comprehension power will increase by WPM (words per minute)

BOOKS RECOMMENDED:

- [1] P D Chaturvedi, P.D. & M Chaturvedi, "*Business Communication: Concepts, Cases and Applications*", PearsonEducation, Singapore Pvt. Ltd, 2004.
- [2] ICMR, "*Business Communication*", Feb 2001.
- [3] J Davies, "*Communication Skills: A Guide for Engineering and Applied Science Students, 2/e*" Pearson Education, 2006.
- [4] Lecture material given by the course teacher.

CIVIL ENGINEERING DEPARTMENT
SCHEME & SYLLABUS
II YEAR

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	AVR3C1	Applied Mathematics - III	PC	3-1-0	4
2.	VLR3C2	Applied Mechanics & Strength of	PC	3-1-1	4+1(P)
3.	VLR3C3	Surveying	PC	3-1-1	4+1(P)
4.	VLR3C4	Construction Material & Technology	PC	3-1-1	4+1(P)
5.	VLR3G1	Structural Mechanics	GE	3-1-0	4
6.	VLR3L1	Drafting & Computational Skills	--	0-0-1	1
7.	SVR3S3	Life Management Skills	--	2-0-0	2
8.	VLR3V3	Comprehensive Viva – III	Virtual	0-0-4	4
Total Credits					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engineering)			
Subject Code & Name		Instructions Hours per Week		Credits			
AVR3C1: Applied Mathematics - III		L	T	P	L	T	P
		3	1	-	3	1	-
Duration of Theory Paper: 3 Hours							Total
							4

Learning Objectives:

- To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like, Laplace transform converts a given ordinary or partial differential equation into a polynomial- Partial Differential Equation can be used to describe a wide variety of phenomena such as sound, heat, electrostatics, fluid flow, elasticity and quantum mechanics, -Differential equation are used to calculate population growth, exponential decay of radioactive substances, motion of a falling object, Newton's law of cooling and various electrical circuits; Statistics useful in risk assessment, random decrement analysis, to monitor remotely the structural health of a structure (such as a bridge, tall building, dams etc); Fourier analysis relevant for PDE-solving and probably the heat equation in three dimensions. The Fast Fourier Transform is employed as a method of Laplace transform inversion to solve problems in the civil engineering fields of viscous-elasticity and hydrology. Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Pre requisites: Basic knowledge of determinants, matrices, differentiation and integration of functions and probability theory.

COURSE CONTENTS:

UNIT –1:

Laplace transform: Definition and properties of Laplace transform, Inverse Laplace Transforms. Convolution theorem, Application of Laplace transform in solution of ordinary differential equations, Simultaneous differential equations with constant coefficients.

UNIT – 2:

Statistics: Brief idea of sampling, t, F and χ^2 distributions and their applications, ANOVA, Statistical Quality Control (SQC), Control Charts, Sampling inspection, Acceptance sampling, Producer's and Consumer's risk, O. C. curve.

UNIT – 3:

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-Falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.

Numerical Solutions of ordinary differential equations - Single and multi-step methods.

Numerical solution of partial differential equation: Classification of second order Partial differential equation, Solution of elliptic, parabolic and hyperbolic equations by Iteration method.

UNIT – 4:

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals, Numerical differentiation, General quadrature formula, Numerical integration using Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule, Simpson's $3/8^{\text{th}}$ rule, Weddle's rule.

UNIT – 5:

Fourier series, Fourier Integral, Fourier transforms, Finite Fourier sine and cosine transform,

Parseval's theorem, continuous time and discrete time Fourier Transform, DFT and FFT, solution of partial differential equations with constant and variable coefficients.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Apply Laplace Transform methods, useful in problems where mechanical/electrical driving force has discontinuities, is impulsive or is a complicated periodic function.
2. Learn how to apply Statistics in solving problems of modern Civil Engineering.
3. Apply Fourier Theory to analyze the quality of signals, how crosstalk, interference, noise, and distortion affect signal quality and to extract information from noisy signals.
4. Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equation, numerical methods work very well.

Books Recommended:

- [1] B.S. Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
- [2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
- [3] Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [4] S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.
- [5] Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
- [6] A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
- [7] Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.
- [8] J. F. James, A Student's Guide to Fourier Transforms with Applications in Physics and Engineering, 3rd Edition, Cambridge University Press, 2011.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engg.) (Full Time)			
Subject Code & Name:	Instructions Hours per Week			Credits			
VLR3C2:Applied Mechanics And Strength of Material	L	T	P	L	T	P	Total
		3	1	2	3	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the fundamentals of the elastic behavior of the engineering materials.
- To provide the knowledge of Strength/Load Bearing capacity of Different Materials.
- To give basic concepts of different types of stresses & strain.
- To understand the applications of stress and strain in engineering field.
- To understand the geometrical properties of sections.
- To Analyze Pin Jointed Frames analytically and graphically.

Pre requisites: Engineering Physics, Engineering Mathematics.

COURSE CONTENTS

Unit I: Geometrical Properties of Sections

Centroid: Definition of centroid and Centre of gravity – Centroid of regular geometrical figures, Centroid of symmetric and anti-symmetric practical Sections, Built up structural sections- Numerical problems. Moment of Inertia: Definition and notation of Moment of Inertia, Polar moment of inertia, Radius of gyration, Parallel and perpendicular axes theorems; M.I. of regular geometrical plane sections, MI of symmetric, asymmetric, and built up sections.

Unit II: Analysis of Trusses

Determinate and indeterminate frames, Classification of frames, Perfect and imperfect frames, Deficient and redundant frames, Assumptions, Analysis of statically determinate pin-jointed frames method of joints, method of section and Graphical method. Virtual work: Concept and principle of virtual work, application of virtual work for problems on beam

Unit III: Simple Stress and Strain

Mechanical properties of materials: strength, stiffness, elasticity, plasticity, toughness, hardness, ductility. Normal stress and shear stress, Normal strain and shear strain, Hooke's law, Poisson's, Deformation of axially loaded bars of constant and varying section, Principle of superposition. Composite sections, Elastic constants, Relationship between elastic constants, Temperature stresses.

Unit IV: Principal Stresses and Principal Strains:

Principal Planes. Principal Stress. Stresses on an Oblique Section of a Body subjected to a Direct Stress in One direction and Two Mutually Perpendicular Directions. Stresses on an Oblique

Section of a Body subjected to a Simple Shear Stress. Stresses on an Oblique Section of a Body Subjected to a Direct Stress in One Plane and Two Mutually Perpendicular Directions accompanied by a simple shear Stress. Mohr's circle of stress.

Unit V: Strain Energy

Resilience and Proof Resilience, Modulus of resilience, Strain Energy in Materials subjected to gradually applied load, suddenly applied load, impact load, strain energy stored in a body of varying section, strain energy stored in a body due to shear, Castigliano's theorem, Maxwell reciprocal theorem.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn behavior of different material under different types of loading.
2. To understand the basic concepts of Principal Stress & Strain.
3. Learn basic fundamentals used in Designing a structural Component.

Books recommended:

- [1] R.K. Rajput, strength of materials
- [2] Nash; Strength of Materials (Schaum), TMH.
- [3] Surendra Singh; Strength of Materials,
- [4] Ramamrutham; Strength of Materials,
- [5] Subramaniam; Strength of Materials; R; Oxford

List of Practical Assignment:

1. Performance of Tensile test to obtained tensile properties of the material.
2. Performance of Tensile test to obtained Stress-Strain curve for Different Material.
3. Performance of Compressive test to obtained Compressive properties of the material.
4. Performance of Shear test to obtained Shear properties of the material.
5. Performance of Bending test to obtained Bending properties of the material.
6. Performance of Brinell hardness Test.
7. Performance of Vickers Hardness Test.
8. Performance of Impact test to obtained Impact Strength of the materials.

Devi Ahilya University, Indore, India				II Year B.E. (Civil Engineering)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
VLR3C3: Surveying	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To make students aware with different advance surveying methodologies applied to carry out large scale survey works as modern instruments have largely changed the approach to survey works with the principles being same.
- To prepare the students to handle the errors they are likely to come across any large scale survey works

Unit-I

Introduction to Surveying:

Overview of Surveying, branches of surveying, principles of Surveying. Instruments Used for various measurements, Electronic Distance Measurement (EDM), Various EDM Instruments, Remote Sensing, GPS and GIS

Unit-II

Vertical Measurements:

Overview and terminologies, Leveling Instruments-Different Types of Levels, Leveling Staff. Temporary and Permanent Adjustments of a Level. Leveling: Classification Based on Purpose of Leveling –Simple leveling, Differential or Compound or Continuous Leveling, Booking and Reducing Levels. Height of Collimation or Height of Instruments Method. Rise and Fall Method, Errors and Precautions in leveling, Balancing Back Sight and Foresight, Error Due to Earth's Curvature and Refraction, Field Problems or Difficulties in Leveling, Numerical Problems.

Unit-III

Angular measurements: Overview and terminologies, Principle of Compass, Types of Compass, Compass Surveying, Traversing, Traversing with Chain and Compass, Designation of Bearings, Calculation of Included Angle from Bearings, Calculation of Bearing From Included Angles Errors and Precautions in Compass Surveying, Local attraction, Correction to Measured Bearing for Local Attraction ,Adjustment of Closing Error. Magnetic Declination, Dip, Introduction Plane Table Surveying, Methods of Plane Table Surveying- Radiation Method and Intersection Method. Introduction to Theodolite. Numerical Problems

Unit –IV

Measurement of Area:

Measurement of Areas and Volumes: Introduction, Areas: Areas from Field Measurements –Area Consisting of Irregular Boundary, Area from Plan –Graphical Method, Measurement of area by Planimeter Errors & Precautions in Computation of Area.

Unit –V

Measurement of Volume:

Volumes: Measurement of Volume. –from Cross Sections, from Spot Levels , from Contours, Area of Sections, Capacity of a Reservoir, Elevation - Capacity Curve, Earthwork, Mass Diagram. Numerical Problems.

Learning Outcomes:

1. On the successful completion of this course the students will get a diverse knowledge of surveying practices applied for real life problems.
2. The students will learn to work with various surveying equipments, like, Theodolite, Total station, etc. in order to apply the theoretical knowledge to carry out practical field work.
3. The knowledge of limits of accuracy will be obtained by making measurements with various surveying equipment employed in practice. H.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engineering)			
Subject Code & Name		Instructions Hours per Week			Credits		
VLR3C4: construction material & technology		L	T	P	L	T	P
		3	1	2	3	1	1
Duration of Theory Paper:3 Hours							Total
							5

Learning objectives:

- To make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.
- To understand the properties of ingredients of concrete, test and concrete mix design.
- To study the behavior of concrete at its fresh and hardened state.

Pre-requisites: Engineering Chemistry:

COURSE CONTENTS

UNIT I

Lime: Impurities in limestone, Classification, Slaking and hydration, Hardening, Testing, Storage, Handling, IS Specifications, Uses Bricks: Classification, Characteristics of good bricks, and Ingredients of good brick

Earth, Harmful substance in brick Earth, Different forms of bricks, testing of bricks.

Mortars: Classification, Uses, Characteristics of good mortar, Ingredients. Cement mortar, Lime Mortar, Lime cement mortar, special mortars

UNIT II

Glass: Definition, constituents, manufacture, classification commercial forms, uses of different types of Glasses.

Timber: Definition, Classification, Characteristics of good Timber, uses of Timber, Physical and Mechanical properties, defects, Seasoning, Preservation, Veneers , Plywood, Fiber Boards, Particle Boards, Chip Boards , Black Boards, Button Board and Laminated Boards, Applications of wood and wood products. Plastics: Classification, Ingredients, General properties, fabrication of plastic products.

UNIT III

Concrete Materials: Cement: OPC: Composition, PPC, Slag cement, Hydration, Setting time. Aggregates: Classification, Characteristics, Deleterious substances, Soundness, Alkali – aggregates reaction, Fine aggregates, coarse aggregates, testing of aggregates.

Admixtures, types and properties, Concrete, Workability, segregation and Bleeding, Tensile and Compressive Strength, Modulus of Elasticity, Effect of Shrinkage and Creep. Mixing and Transporting, Placing, Compaction, Finishing, Curing, Quality Control, Design of Concrete Mixes

UNIT IV

Paints, Enamels and Varnishes: Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and color wash, Varnish, French polish, Wax Polish. Plastering and Pointing: Plastering with cement mortar, Defects in plastering, Pointing, white washing, color washing, Distemping.

UNIT V

Foundations: Function of Foundations, Essential requirement of good foundation, Different types of shallow and deep Foundations.

Brick masonry: Definitions, Rules for bonding, Type of bonds – stretcher bond, Header bond, English bond, Flemish Bond, Comparison of English Bond and Flemish Bond. Doors and Windows: Common types of doors and windows of timber and metal.

Flooring: Components of a floor, selection of flooring materials, Brick flooring, Cement concrete

flooring, mosaic, marble, Terrazzo flooring, Tiled roofing. Roofs: Types, Pitched roofs and their sketches, Lean –to roof, King Post –Truss, Queen post truss and Simple steel Truss, Roof Covering

materials: AC Sheets GI sheet

Learning Outcomes:

1. Knowledge on properties of materials for concrete by suitable test and mix design of concrete.
2. Compare the properties of most common and advanced building materials.
3. Understand the typical and potential applications of these material.
4. Understand the importance of experimental verification of material properties
5. Will have understanding of different construction techniques, practices and equipments. They will be able to plan the requirements for substructure and superstructure a construction.

Books & References Recommended:

- [1] Surendra Singh, Engineering Materials, Vikas Publishing House.
- [2] Rangwala, Engineering Materials, Charatar Publications.
- [3] Shetty M.S., Concrete Technology, Theory and Practical, S. Chand & Co. Ltd., New Delhi.
- [4] Sushil Kumar, Building Construction.

List of Experiments:

1. To determine the Compressive Strength of Modular Brick.
2. To determine the Water Absorption of Modular Brick.
3. To determine the Fineness of Cement.
4. To determine the Consistency of Cement.
5. To determine Initial and Final Setting Time of cement by Vicat Apparatus.
6. To determine compressive strength of Cement.
7. Sieve Analysis of Fine and Coarse Aggregates and determination of Fineness Modulus.
8. To determine Flakiness and Elongation Index of Aggregates.
9. To determine workability of Fresh Concrete by Slump Cone Test.
10. To determine Compressive Strength of Hardened Concrete.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E (Civil Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
		L	T	P	L	T	P	Total
VLR3G1: Structural Mechanics		3	1	-	3	1	-	4
Duration of Theory Paper: Hours								

Learning Objectives:

- To analyze determinate beams and sketch S.F. and B.M. diagram.
- To derive simple bending equation and understand its applications.
- To Analysis of propped cantilever & fixed beam and draw SFD, BMD.
- To understand the behavior of columns under different conditions
- To understand the concept of unsymmetrical bending

Pre requisites: Engineering Mechanics, Strength of materials

COURSE CONTENTS

Unit I: Shear force and Bending Moment

Types of beams, Types of supports, shear force and bending moment at any cross section of a beam. Sketching of shear force and bending moment diagrams for cantilever, simply supported and over hanging beams for any type of loading, Significance of point of contra flexure, Relationship between rate of loading, shear force and bending moment.

Unit II: Stresses and Deflection in beams

Theory of simple bending : Equation of bending . Neutral axis , Section -Modulus, Bending & she arstress distribution across a section in Beams.

Slope and deflection of beam by Double Integration Method. Conjugate Beam Method, Area Moment Method,

Unit III: Fixed and Continuous Beams

Beams fixed at ends, Beams of varying Cross-Sections, Partially Fixed at Ends. Effect of Settlement of Supports. Three Moment Theorem for Continuous Beams, Beams of uniform and varying Cross-Sections. Effect of Settlement of Supports.

Unit IV: Columns and Struts

Behavior of axially loaded short, medium and long column members, Buckling load, Euler's theory, Different

End conditions, Empirical formulae, Rankine's formula Straight line formula, Secant formula for columns subjected to eccentric loading.

UNIT V: Unsymmetrical Bending and Curved Beam

Unsymmetrical Bending: Principal Moment of Inertia, Unsymmetrical Bending of Standard Structural Section, Change in Orientation of Neutral axis-plane, Shear Centre.

Curved Beams: stresses due to bending by Winkler Bach theory rectangular, trapezoidal, circular solid sections, crane hook problem.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn behavior of different beams under different types of loading.
2. Understand the basic concepts of columns and struts.
3. Learn the distribution of stresses along a structural Component.
4. Design the column & struts used in Mechanical as well as Civil Engineering.

Books recommended:

- [1] Nash; Strength of Materials (Schaum), TMH.
- [2] Rattan SS; strength of Materials; TMH
- [3] Negi; Strength of materials; TMH
- [4] Surendra Singh; Strength of Materials,
- [5] Ramamrutham; Strength of Materials,
- [6] Subramaniam; Strength of Materials; R; Oxford

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E (Civil Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
VLR3L1: Drafting and Computation Skills		L	T	P	L	T	P	Total
		0	0	1	0	0	1	1
Duration of Theory Paper: Hours								

Learning Objectives:

1. To analyze determinate beams and sketch S.F. and B.M. diagram.
2. To derive simple bending equation and understand its applications.
3. To Analysis of propped cantilever & fixed beam and draw SFD, BMD.
4. To understand the behavior of columns under different conditions
5. To understand the concept of unsymmetrical bending

Pre requisites: Engineering Mechanics, Strength of materials

COURSE CONTENTS

Unit I: Shear force and Bending Moment

Types of beams, Types of supports, shear force and bending moment at any cross section of a beam. Sketching of shear force and bending moment diagrams for cantilever, simply supported and over hanging beams for any type of loading, Significance of point of contra flexure, Relationship between rate of loading, shear force and bending moment.

Unit II: Stresses and Deflection in beams

Theory of simple bending : Equation of bending . Neutral axis , Section -Modulus, Bending & she arstres distribution across a section in Beams.

Slope and deflection of beam by Double Integration Method. Conjugate Beam Method, Area Moment Method,

Unit III: Fixed and Continuous Beams

Beams fixed at ends, Beams of varying Cross-Sections, Partially Fixed at Ends. Effect of Settlement of Supports. Three Moment Theorem for Continuous Beams, Beams of uniform and varying Cross-Sections. Effect of Settlement of Supports

Unit IV: Columns and Struts

Behavior of axially loaded short, medium and long column members, Buckling load, Euler's theory, Different

End conditions, Empirical formulae, Rankine's formula Straight line formula, Secant formula for columns subjected to eccentric loading.

UNIT V: Unsymmetrical Bending and Curved Beam

Unsymmetrical Bending: Principal Moment of Inertia, Unsymmetrical Bending of Standard Structural Section, Change in Orientation of Neutral axis-plane, Shear Centre.

Curved Beams: stresses due to bending by Winkler Bach theory rectangular, trapezoidal, circular solid sections, crane hook problem.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn behavior of different beams under different types of loading.
2. Understand the basic concepts of columns and struts.
3. Learn the distribution of stresses along a structural Component.
4. Design the column & struts used in Mechanical as well as Civil Engineering.

Books recommended:

- [1]Nash; Strength of Materials (Schaum), TMH.
- [2]Rattan SS; strength of Materials; TMH
- [3]Negi; Strength of materials; TMH
- [4]Surendra Singh; Strength of Materials,
- [5]Ramamrutham; Strength of Materials,
- [6]Subramaniam; Strength of Materials; R; Oxford

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Civil Engineering)				
Subject Code & Name	Instructions per Week		Hours	Credits			
SVR3S3	L	T	P	L	T	P	Total
Life Management Skills	2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To provide an overview on Life Skills Management
- To make students able to understand themselves and their Role in Society
- To develop Healthy Personality
- To align them as complete self: Mind, Body and Soul

Pre requisites: Nil

COURSE CONTENTS:

UNIT-I

Basics of Life Skills Management: Understanding Self and Psychological Problems

Life Skills Management: Concepts and Applications, Basics of Brain-Structure, Hormones: Role of Hormones in changing mood and emotions, Role of genes, Understanding Memory.

Normal Self: Concept of Normality. Characteristics of Healthy Personality, Levels of Personality Dysfunctions, Ways to offset depression. Anxiety: Symptoms and Dealing with anxiety. Managing Anger, and Right attitude towards competition. Understanding the reasons behind OCD.

Unit-II

Managing Habits

Neurology of Habits, Developing Discipline in creating new habits, will-power, Causes of Addictions, Changing destructive habits, Habits of highly effective people.

Relaxation Techniques: Meditation, Effects of Meditation. Positive Attitude towards oneself, Equanimity in oneself, Happiness – a state of mind and related techniques.

Unit-III

Relationship Management

Emotional Intelligence: Core Domain: Self Awareness, Self Regulation, Social Awareness and Relationship Management. Relationship Management: Four Criteria for Effective Relationship Management, Competencies in the Relationship Management.

Ability to size-up situations, Role of Empathy Basics of Interpersonal Communication: Understanding and Observing Non-Verbal Behavior, Listening skills. Profiling Personal Environments. Understanding the types of Personality & their Motivating-Factors. Concepts of healthy relationships.

Unit-IV

Stress Management

Understanding the Physiology of Stress, Symptoms of Stress. Stress and Performance, effects of Stress on Learning, Oversensitivity, Focus and Concentration, Techniques of Stress Management. Concepts of Crisis Management, Dealing with Peer Pressure and Complexes, Assertiveness Training, Avoiding Groupthink, Dealing with distractions.

Unit-V

Mental Health and Wellness

Concept of Wellness: Measures to improve Wellness. Sleeping and Mind, Yoga and Exercise, Concepts of Balanced Diet, Importance of Recreational Practice, Role of art in wellness, How imagination shapes our Mind-Set. Wellness Programs for Professionals.

Learning Outcomes:

Upon completing the course, students will be able to:

- [1] Handle Stressful Situations
- [2] Understand their priorities
- [3] Cope with different Psychological Problems
- [4] Find Real Happiness

MECHANICAL ENGINEERING DEPARTMENT (PART TIME)
SCHEME & SYLLABUS
II YEAR

S.No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1	MEP3C1	MATERIAL SCIENCE	PC	2-1-1	4
2	MEP3C2	STRENGTH OF MATERIAL	PC	2-1-1	4
3	MEP3C3	MANUFACTURING PROCESS	PC	2-1-1	4
4	MEP3G1	MACHINE DESIGN & DRAWING	GE	2-1-0	3
5	MEP3V3	COMPREHENSIVE VIVA -III	VIRTUAL	0-0-4	4
				TOTAL CREDITS	15(A)+4(V)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP3C1 MATERIAL SCIENCE	L 2	T 1	P 1	L 2	T 1	P 1	Total 4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To render the information that involves investigating the relationship that exists between the structures and properties of materials.
2. To provide the knowledge of Engineering Materials.
3. To give basic concepts of Material properties in terms of their utilization in machine Design.
4. To provide the knowledge about testing of materials.

Pre requisite(s): Engineering chemistry, Engineering Physics.

COURSE CONTENTS

UNIT-I

Description of Crystal Structure and Imperfections in metal crystals : Review of crystal structure :Seven Crystal System. Bravais lattice. Symmetry and properties of simple crystal structure, Millers indices. Imperfections in metal crystals, Point Defects, Edge Dislocation, Screw dislocations slip planes.

UNIT-II

Ferrous and Non-Ferrous Metals and Alloys: Properties and application of various steels and cast iron. Effect of impurities, in ferrous metals. Effect of common alloying elements on the steels, High speed steels, Stainless steel, other steel. Corrosion and its prevention. Composition, microstructure, properties and applications of Aluminum and its principle alloys, Copper and its principle alloys, Nickel and its principle alloys.

UNIT-III

Concept of Phase Diagrams and Equilibrium Diagrams : Iron Allotropy, cooling curves, phase diagrams, Gibbs phase rule, Various types of phase diagrams, Interpretation of Phase diagrams, Iron carbon equilibrium diagram, Classification of Equilibrium Diagrams: Eutectic, Eutectoid and Peritectic transformation, Iron carbon equilibrium diagram, TTT diagrams, Comparison of Iron carbon equilibrium diagram and TTT diagrams.

UNIT-IV

Heat Treatment of Metals and Alloys and Powder metallurgy: Classification of Heat treatment processes, Surface or case hardening of steel, Defects in heat treated parts. Manufacturing of metal powders. Sintering and secondary operations. Design considerations and applications.

UNIT-V

Metallography, Destructive and Non-Destructive Testing: Introduction to Metallography, Study of sample preparation and metallurgical Microscope. Study of Mechanical Properties and their significance in Engineering Applications, Classification of testing of materials, Tensile, Compression, Bend, Torsion, Fatigue, Impact, Hardness, Creep Tests, Ultrasonic, Magnetic, Radiography Tests etc.

Learning Outcomes:

After Completing the Course, Student will be able to:

1. Have the knowledge of materials.
2. Understand the mechanical properties of materials.
3. Know about the development of new materials having comparable properties.
4. Consider the “cradle-to-grave” life cycle of materials relative to machine design and manufacturing processes.

BOOKS RECOMMENDED:

- [1] Callister W.D.Jr., Materials Science and Engineering an Introduction, Wiley Publications(P) Ltd,2004.
- [2] Askeland D. R.,Fulay,P.P., Essentials of Materials Science and Engineering, Cengage Learning Publications,2010
- [3] Raghavan, V.,Materials Science and Engineering, Prentice-Hall of India (P) Ltd.,2001.
- [4] Khanna, O.,P., Material Science and Metallurgy, Dhanpat Rai Publications,2005

LIST OF PRACTICAL ASSIGNMENT

1. Performance of hardness test of ferrous materials using Rock Well hardness testing machine
2. Performance of magnetic particle crack detection to detect the cracks
3. Performance of impact test on a plastic test sample to detect impact strength of material.
4. Performance of crack detection using ultrasonic crack detector.
5. Study and perform steps involved in sample preparation for observing the microstructure under metallurgical microscope
6. Study and perform various heat treatment process using muffle furnace
7. Study of construction and function of metallurgical microscope.
8. Study of microstructures of ferrous metal alloys
9. Study of iron carbon diagram
10. Study of T.T.T. diagram

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP3C2 STRENGTH OF MATERIALS	L	T	P	L	T	P	Total
	2	1	1	2	1	1	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the knowledge of Strength/Load Bearing capacity of Different Materials.
- To give basic concepts of different types of stresses & strain/ Mechanics of Material.
- To develop skill to analyze the distribution of stresses in material.
- To know how to find the Torsional stresses and Beam strength of column.

Pre requisite(s): Engineering Physics, Engineering Mathematics

COURSE CONTENTS

UNIT-I

Stress and strain: Tensile, compressive and shear stresses, complimentary shear stresses with varying cross section, Temperature stresses, Modulus of Elasticity. Modulus of rigidity, Bulk modulus, Poisson's ratio, Relations between the three moduli, Stress on oblique Section of a bar subjected to axial stress, Compound stresses, Principle stresses & strain, Mohr's circle of stresses and strain.

Elastic strain energy, Different type of loading, Resilience, Proof resilience, Strain energy in Tensile, Static, Sudden falling, gradually applied and Impact loading. Strain energy due to shear stresses.

UNIT-II

Shear force and Bending moment of Beams: Beams, Classification of beams, Types of loading, span, Shear force and Bending moment, Relation between load, shear force and bending moment, shear force and bending moment diagram for cantilever and simply supported beam with concentrated load, Point load, uniformly distributed load, gradually varying load, Eccentric point load.

UNIT-III

Bending stresses & Deflection of Beams: Introduction, Pure Bending ,Simple Bending theory, Expression for Bending Stress, Moment of inertia of section, Bending Stresses in Symmetrical Section, Shearing stresses in Beams, Distribution of shearing stress in different sections..

Slope & Deflection of Beam subjected to Uniform Bending Moment, Relation between Slope, Deflection and Radius of Curvature, Deflection of simply supported beam carrying a point load and uniform distributed load, Macaulay's Method and Moment Area Method for finding out deflection of beam.

UNIT-IV

Torsion of Circular shaft: Introduction, Pure Torsion, Torsional stress & strain in circular shafts, Polar moment of Inertia, Torsional moment of resistance, Torsion equation of circular shaft, Power transmitted by shaft, composite shaft, Strength of shaft, Torsional shear stress in shaft, Shaft of varying section.

UNIT-V

Columns & Struts: Introduction, Classification of column, Failure of column Euler's theory for column, End conditions of column and struts, Equivalent length of column, Calculation of

equivalent length for different end conditions of column, Slenderness ratio, limitations of Euler's formula, Rankin's formula for long column and eccentric loading. Formula for Indian standard code of practice.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Learn behavior of different material under different types of loading.
- To understand the basic concepts of Principal Stress & Strain.
- Learn basic fundamentals used in Designing a Mechanical Component.
- Design the column & struts used in Mechanical as well as Civil Engineering.

BOOKS RECOMMENDED:

- [1] Warnock Ramamurtham, *Strength of Materials*, 16/e, Dhanpat Rai Publications, 2011
- [2] Bansal R K, *Strength of Materials*, 4/e, Laxmi Publications(P) Ltd, 2012
- [3] Popov *Mechanics of Solids*, 2/e, Pearson Education (India), 1998
- [4] Timoshenko, *Elements of Strength of Materials*, 3/e, Wadsworth Publishing; 2004

LIST OF PRACTICAL ASSIGNMENT

1. Performance of Tensile test to obtained Tensile properties of the material.
2. Performance of Tensile test to obtained Stress-Strain curve for Different Material.
3. Performance of Compressive test to obtained Compressive properties of the material.
4. Performance of Shear test to obtained Shear properties of the material.
5. Performance of Bending test to obtained Bending properties of the material.
6. Performance of Brinell Hardness Test.
7. Performance of Vickers Hardness Test.
8. Performance of Torsion test to obtained torsional properties of the material.
9. Performance of Torsion test to obtained T- θ Curve.
10. Performance of Impact test to obtained Impact Strength of the materials.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MEP3C3 MANUFACTURING PROCESSES	L	T	P	L	T	P	Total
	2	1	1	2	1	1	4
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To provide an understanding of the various processes which are used extensively in the manufacturing of mechanical components.
- To learn about the constructional features of the standard types of machine tools used in shop floor
- To learn about the process parameters and the standard tooling used on various machine tools.
- To learn about the basic measurement and inspection tools used in shop floor.

Pre requisite(s): Elements of Mechanical Engineering, Workshop Practice

COURSE CONTENTS

UNIT-I

Production of Axi-symmetric Parts: Introduction to the mechanics of metal cutting, Turning and related processes, Turning parameters, Constructional features and operation of turning and related machine tools: Lathes, Capstan-Turret lathes, Automats, CNC lathes, Machining centers and Turning centers. Single point cutting tools: types and geometry, Tool Materials.

UNIT-II

Production of Prismatic Parts: Introduction to the Shaping, Planning and Milling processes and their process parameters, Constructional features and operation of Shaper, Planner, Slotter and Milling machines, Tool holding, Work holding and Indexing methods, Cutting tools: types and geometry.

UNIT-III

Drilling, Broaching, Screw Thread and Gear cutting: Introduction to operations like Drilling, Boring, Reaming, Counter Boring and Counter Sinking. Machine Tools for drilling and related hole making processes, Drilling machine accessories, Process parameters for drilling and boring operations, Accuracy and finish of drilled holes, Broaching processes and broaching machines, power calculations. Cutting tools like drills, reamer, broach and taps: types and geometry. Thread forms and thread fits, External and Internal thread cutting processes. Gear: types and methods of gear manufacturing, Machine tools and tooling used for gear manufacturing.

UNIT-IV

Abrasive Machining: Introduction to various grinding operations, Types of abrasives and bonds, Marking system for grinding wheels and their selection criteria, Mechanics of grinding, Truing and dressing of grinding wheels, Grinding machines for cylindrical and surface grinding, Tool & cutter grinders. Safety in grinding, Other abrasive processes: Honing, Lapping, Super finishing, Polishing and Buffing.

UNIT-V

Metrology: Basic measurements and the use of Squares and Surface Plates, Micrometers, Vernier Calipers, Gage blocks, Inside, Depth and Height measuring instruments, Angular measurements, Limits, tolerances and fits: Need for limit systems, Interchangeability, Statistical assembly, Selective assembly, Limit system. Taylor's principles of gauge design, Gauge tolerance and wear allowances, Types of limit gauges, Thread or screw gauges, Advantages & limitation of limit gauges. Measurement and inspection of external screw threads and gears.

Learning Outcomes :

Upon Completing the Course, Student will able to:

1. Identify the processes used for the manufacturing of components of various sizes and shapes.
2. Understand the construction and working of the machine tools used for various operations along with the hands on experience of some of them during laboratory work.
3. Select the tooling and the process parameters for the processing of common engineering work materials.
4. Understand the use of basic measurement and inspection tools used in shop floor, recognize and design the three types of plug and ring gauges based on the limit system.

BOOKS RECOMMENDED:

- [1] Gupta I.C., *A Textbook of Engineering Metrology, 7ed*, Dhanpat Rai Publications.
- [2] Sharma P. C., *Production Technology, Production Engineering*, S. Chand and Co.
- [3] HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd.
- [4] Chapman W.A.J., *Workshop Technology Part 1, 2 and 3, 4ed*, Viva Books Private Ltd.
- [5] Hajra Choudhury A.K., Hajra Choudhury S.K., Roy Nirjhar *Elements of Workshop Technology : Machine Tools (Volume - 2)*, Media Promoters and Publishers Pvt. Ltd.

List of Practical Assignment:

- 1) Study of the geometry of single point cutting tools.
- 2) Study of the geometry of milling cutters.
- 3) Study of the geometry of double fluted twist drill.
- 4) Study of the geometry of Taps and Reamer.
- 5) Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
- 6) Study of constructional features of the Shaper and to machine a job as per given dimensions on it.
- 7) Study of constructional features of the Milling m/c and to machine a job as per given dimensions on it.
- 8) To study the indexing of workparts, to be milled, using a dividing head.
- 9) Study of comparators.
- 10) Measurement and inspection of screw threads and cutting tools using a Tool Makers Microscope and Profile Projector.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP3G1 MACHINE DESIGN AND DRAWING	L	T	P	L	T	P	Total
Duration of Theory Paper: 4 Hrs	2	1	0	2	1	0	3

Learning Objectives:

- To develop in students, machine drawing skills for communication of design concepts, ideas and design of engineering products
- To expose them to existing national standards related to drawings of machine parts.
- To introduce the concept of design procedure of simple machine elements.

Prerequisite(s): Engineering Drawing.

COURSE CONTENTS

UNIT-I

Design Practice Introduction: Introduction, Classification, General Considerations and Procedure of Machine Design, Design Stress, Factor of Safety, Stress and Deflection Analysis, Engineering Materials and Applications, Design of Pins / Keys, Cotter and Knuckle.

UNIT-II

Design of Permanent Joint: Design of Riveted Joints for Boiler, Structures and Eccentric Loading. Design of Welded Joints for Direct and Eccentric loading.

UNIT-III

Design of Temporary Joints: Design of Screw Fasteners for Direct and Eccentric loading. Design of Shafts and Couplings.

UNIT-IV

Machine Drawing Concepts and Practices:

Introduction, Classification of Machine Drawings Assembly Drawing, Part Drawing, Detailed Drawing, Catalogues Drawing, Drawing for Instruction Manuals, Schematic Representation, Patent Drawing. Principles of Drawings, Sectioning, Dimensioning, Limits, Fits and Tolerance, Symbols and Conventional Representation. Assembly Drawings – Introduction, Types of Assembly, Importance of BOM, Assembly procedures, Assembly of Engine Parts.

UNIT-V

Assembly Drawing Concepts and Practices and Introduction to CAD: Assembly of Machine Tools Parts, Assembly of Boiler Mountings. Production Drawings - Definitions, Difference with Normal Drawings, Method of amendment of Corrections. Reproduction of Drawing - Blue printing, Ammonia Printing, Xeroxing, Printing, Plotting. Introduction of Computer Aided Drafting - Computer Aided Drafting and Design, Advantages of Computer Aided Drafting and Design, CAD Software.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Perform free hand sketching of machine parts with standard of machine drawing.
2. Select engineering materials based on their mechanical properties.

3. Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints.
4. Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints and couplings using CAD/CAM software.

Books Recommended:

- [1] V B Bhandari, *Design of Machine Elements*, 3/e, McGraw Hill Education, 2015.
- [2] N D Bhatt and V M Panchal, *Machine Drawing*, Charotar Publishing House, 2015.
- [3] K. Mahadevan, K. Balaveera Reddy, *Design Data Hand Book*, CBS Publishers & Distributors, New Delhi, 2015.
- [4] V B Bhandari, *Design Data Hand Book*, McGraw Hill Education, 2015.
- [5] PSG, *Design Data: Data Book of Engineers* by PSG college –Kalaikathir Achchagan-Coimbatore.
- [6] P S Gill, *A Text Book of Machine Drawing*, S K Kataria & Sons, 2015.
- [7] P C Gope, *Machine Design: Fundamentals and Applications*, 1/e PHI, 2015.
- [8] R L Norton, *Machine Design: An Integrated Approach*, Pearson Education, 2015.

LIST OF PRACTICAL ASSIGNMENT

1. Draw the Symbols and Conventional Representation and Sections of Simple Machine Elements.
2. Design and Conventional Drawing / Computer Aided Drawing of Cotter Joint and Knuckle Joint.
3. Design and Conventional Drawing / Computer Aided Drawing of Couplings.
4. Design and Conventional Drawing / Computer Aided Drawing of Riveted Joints.
5. Design and Conventional Drawing / Computer Aided Drawing of Welded Joints.
6. Design and Conventional Drawing / Computer Aided Drawing of Screw Fasteners.
7. Conventional Drawing / Computer Aided Drawing of Engine Parts.
8. Conventional Drawing / Computer Aided Drawing of Machine Tool Parts.
9. Conventional Drawing / Computer Aided Drawing of Boiler Mountings.
10. Design / Analyse a mechanical structure which may involve different components included in syllabus. Prepare assembly and production drawings

M. E. FT Computer Engineering 3rd Semester Scheme

SEM III			L-T-P
1	SER3D1	Dissertation Phase I	0-0-12
2	SER3V3	Comprehensive Viva III	0-0-4
Total Credit for SEM III			12 actual + 4 virtual credits

M. E. FT Information Technology 3rd Semester Scheme

SEM III			L-T_P
1	ISR3D1	Dissertation Phase I	0-0-12
2	ISR3V3	Comprehensive Viva III	0-0-4
Total Credit for SEM III			12 actual + 4 Virtual credits

M. E. FT Digital Instrumentation 3rd Semester Scheme

SEM III			L-T-P
	DIR3D1	Dissertation Phase I	0-0-12
	DIR3V3	Comprehensive Viva III	0-0-4
Total Credit for SEM III			12 actual + 4 Virtual credits

M. E. FT Digital communication 3rd Semester Scheme

SEM III			L-T-P
1	DCR3D1	Dissertation Phase I	0-0-12
2	DCR3V3	Comprehensive Viva III	0-0-4
Total Credit for SEM III			12 actual + 4 Virtual credits

M. E. FT Industrial Engineering & Management 3rd Semester Scheme

SEM III			L-T-P
1	IMR3D1	Dissertation Phase I	0-0-12=12
2	IMR3V3	Comprehensive Viva III	0-0-4=4
Total Credit for SEM III			12 actual + 4 Virtual credits

M. E. FT Design & Thermal 3rd Semester Scheme

SEM III L-T-P			
1	DTR3D1	Dissertation Phase I	0-0-12=12
2	DTR3V3	Comprehensive Viva III	0-0-4=4
Total Credit for SEM III			12 actual + 4 Virtual credits

COMPUTER ENGINEERING DEPARTMENT
ME PART TIME 3rd SEMESTER
SCHEME & SYLLABUS (SOFTWARE ENGINEERING)

SR NO.	Sub Code	Sub Name	L-T-P	Sub Type
1.	SEP3C4	Software Project Planning and Management	3-1-1	PC4
2.	SEP3C5	Design Pattern	3-1-1	PC5
3.	SEP3Gx	Generic Elective II	3-1-0	GE2
4.	SEP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2Virtual Credits	

LIST OF GENERIC ELECTIVES II

3	SEP3G4	Data Mining & Warehousing	3-1-0	GE
3	SEP3G5	Cloud Computing	3-1-0	GE
3	SEP3G6	Simulation and Modelling	3-1-0	GE

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SEP3C4 Software Project Planning and Management	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- This course provides the knowledge for correct software development life cycle, create realistic project plans, and manage a software development team through each phase of the project. The purpose of software project planning and management is to forecast many hazards and risks and problems as possible. The student shall be to plan, organize and control activities so that the project is completed as successfully as possible in spite of all the risks.

Pre-requisites:

A course on software engineering and practical experience of handling college projects.

COURSE CONTENTS

UNIT-I:Introduction to Software Project Management

Project Definition, Contract Management, Activities Covered by Software Project Management, Overview of Project Planning, Stepwise Project Planning

UNIT-II:Project Evaluation

Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation

UNIT-III:Activity Planning

Objectives, Project Schedule, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass, Backward Pass , Activity Float, Shortening Project Duration , Activity on Arrow Networks , Risk Management , Nature of Risk , Types of Risk , Managing Risk , Hazard Identification , Hazard Analysis , Risk Planning and Control

UNIT-IV:Monitoring and Control

Creating Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Managing Contracts, Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management , Acceptance.

UNIT-V: Managing People and Organizing Teams

Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation ,The Oldman, Hackman Job

Characteristics Model, Working In Groups, Becoming a Team, Decision Making, Leadership, Organizational Structures, Stress, Health and safety, case studies

Learning Outcomes:

- The aim of the course is to help the student to be a responsible member of the software development team. The student after completion of the course shall be able to comprehend project problems and apply the knowledge on projects and software development. The student also shall be aware of the conditions and constraints such as resources, time, cost and quality

Text Books:

[1] Bob Hughes, Mikecoterrell, “Software Project Management”, Third Edition, Tata McGraw Hill, 2004.

REFERENCE BOOKS

- [1] Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
[2] Royce, “Software Project Management”, Pearson Education, 1999.
[3] Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP3C5 Design Pattern	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To strengthen the knowledge of Object Oriented Design and Development by understanding various design patterns.

Pre requisites:

Knowledge of object oriented system concepts, object oriented analysis and modelling and object oriented programming.

COURSE CONTENTS

UNIT-I

Introduction to Software Patterns, Overview of UML, Class Diagrams, Collaboration Diagrams, State chart Diagram, Deployment Diagram, Fundamental Design Patterns: Delegation, Interface, Abstract Super-class, Interface and Abstract class, Immutable, Marker Interface.

UNIT-II

Simple Factory pattern, Factory Method, Abstract Factory, Builder, Prototype, Singleton

UNIT-III

Adaptor, Bridge, Composite, Façade, Flyweight, Decorator, Proxy Pattern

UNIT-IV

Chain of Responsibility, Command, Interpreter, Mediator, Memento Pattern

UNIT-V

Observer, State, Strategy, Template Method, Visitor, Iterator Pattern.

Learning Outcomes:

To learn Various Design Patterns and learn their application in real software development

BOOKS RECOMMENDED:

- [1] Gamma, Helm, Johnson, Vlissides, Design Patterns. Elements of Reusable Software., Pearson Education 2006
- [2] Cooper, J. W., Java Design Patterns, A Tutorial, Pearson Education, 2000.
- [3] Freeman, Freeman, Head First Design Patterns, O'Reilly Pub. 2007
- [4] Mark Grand, Patterns in Java Vol. 1, Wiley 2002
- [5] Mark Grand, Patterns in Java Vol. 2, Wiley 2002
- [6] Mark Grand, Patterns in Java Vol. 3, Wiley 2002
- [7] Douglas Schmidt, Pattern Oriented Software Architecture Vol1, John Wiley 2000, also called as POSA

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP3G4	L	T	P	L	T	P	Total
Data Mining & Warehousing	3	1	2	3	1	0	5
Duration of Theory Paper: 3 Hours							

Objectives:

- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models.

Unit-I

Data Mining -Introduction: Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Knowledge Discovery in Databases (KDD), KDD Process, Data Preprocessing, Data Cleaning, Data Transformation, Data Compression and Dimension Reduction, Principal Component Analysis, Binning Methods.

Unit-II

Data Warehousing –Introduction and Design: Overview and Concepts: Need for data warehousing, basic elements of data warehousing, Architecture and Infrastructure: Architectural components, Infrastructure and metadata. Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling, data extraction, transformation and loading, data quality. OLAP in data warehouse –ROLAP, MOLAP, HOLAP. OLTP Vs OLAP, Various Data Warehouse Schemas.

UNIT-III

Association & Classification Techniques: Introduction, Frequent itemset mining methods – Apriori, FP-Growth, Pattern evaluation methods, Basic concepts of classification, Decision tree induction, Bayes classification, Rule-based classification.

UNIT-IV

Clustering Techniques: Introduction, Clustering paradigms; Partitioning algorithms – K-Means, K-Medoid, CLARA; Partition based clustering – BIRCH; Density based clustering - DBSCAN; Categorical clustering algorithms, Evaluation of Clustering.

UNIT-V

Other DM techniques & Web Mining: Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends. Web Mining : Introduction Web content mining, Web structure Mining, Web Usage Mining.

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis.

Learning Outcomes:

- Store voluminous data for online processing
- Preprocess the data for mining applications
- Apply the association rules for mining the data
- Design and deploy appropriate classification techniques

Reference Books:

- [1] Data Mining Techniques; ArunK.Pujari ; University Press.
- [2] Data Mining Concepts and Techniques, Jiawei Han Micheline Kamber,Jianpei, Morgan Kaufmann.
- [3] Data Mining; Adriaans&Zantinge; Pearson education.
- [4] Mastering Data Mining; Berry Linoff; Wiley.
- [5] PaulrajPonniah, “Data Warehousing Fundamentals”, John Wiley.
- [6] Text Mining Applications, Konchandy, Cengage

INFORMATION TECHNOLOGY DEPARTMENT
ME PART TIME 3RD SEMESTER
SCHEME & SYLLABUS (INFORMATION SECURITY)

Sub Code	Sub Name	L-T-P	Sub-Type
ISP3C1	Information Security Management	3-1-1	PC4
ISP3C2	Digital Forensics and Security Audit	3-1-1	PC5
ISP3Gx	Generic Elective II	3-1-0	GE2
ISP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III		14 actual + 2 Virtual credits	

LIST OF GENERIC ELECTIVES II

3	ISP3G1	Cloud Computing	3-1-0	GE
3	ISP3G2	Applied Cryptography	3-1-0	GE
3	ISP3G3	Cyber Crime and Information Warfare	3-1-0	GE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP3C1: Information Security Management	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

- To study the methods of managing information systems in a secure way.

COURSE CONTENT

Unit I : Foundation

Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access). Threats - Viruses ,worms , Trojan horse, bombs, trap doors, spoofs, email virus, macro viruses, remedies, Intruders, Malicious software.

Unit II : Communication Security

Encryption, Public Key Infrastructure, Digital Signatures, Digital signatures.

Unit III : User Authentic Mechanisms

Passwords, Authentication tokens, Certificate based Authentication, Single Sign on (SSO), Kerberos, X.509, Cryptographic Solutions- A case study.

Unit IV : Information Security Protocols

Secure Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Secure Electronic Transaction (SET), Electronic Money, Email Security.

Unit V : System and Application Security

Intrusion detection techniques, techniques to provide privacy in Internet Application and protecting digital contents(music, vedio, software) from unintended use, authentication. IP security, Web security. file System security, program and security, memory security, Sandboxing. Security threads protection intruders- Viruses- trusted system. Firewalls, vulnerabilities & threats, Network Denial of service attack, Contract Signing, Secret Splitting.

Course outcomes:

After the completion of course student will be able to:

1. Understand the various security algorithm.
2. Encryption and decryption algorithm

Text and Reference books:

- [1] Dieter Gollman; Computer Security; John Wiley & Sons 1999
- [2] Mathew Bishop; Computer Security; Art and Science; Addison-Wisley Oct. 2007
- [3] Mathew Bishop; Introduction to computer Security; Addison-Wisley Oct 2004
- [4] Kaufman, Perlman and Speciner; “Network security”; Pearson Education 1995.
- [5] Atul Kahate; “Cryptography and Network Security”; Tata McGraw-Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME II Year Information Technology (Sp. Information Security) Semester- B				
Subject Code & Name	Instructions Hours per Week			Credits			
ISP3C2: Digital Forensics and Security Audit	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objective

- At the completing of the course, students will be able to understand the fundamental concepts of forensic science and digital forensics principles. Learn to identify importance of digital evidence.

COURSE CONTENT

Unit I : Introduction of Digital Forensics:

Digital crime, current scenario of digital crime in India, Evidence and its role in IT Act, Digital Evidence, Digital Vs Physical Evidence, nature of Digital Evidence, precautions while dealing with Digital Evidence, challenging aspects of Digital Evidence, Digital Devices, evidential potential of digital devices, Digital Forensics, dimensions and principles of Digital Forensics, Digital Forensic Investigation, Investigation Models, Scientific method in Digital Investigation, Research potential and scope in digital forensics.

Unit II : Data and Evidence Recovery:

Seizure of digital information : Issues, methodology, factors limiting wholesale seizure, pulling the plug or not; data objects, Storage Media, Variety of data, Recovered data objects, electronic evidence: secure boot and write blockers, disk file organization ,disk and file imaging; forensic tools, forensic data carving, data recovering techniques.

Unit III : Mobile and Live Forensics Investigations:

Mobile phone forensics: mobile device characteristics, memory considerations, tools classification, flasher boxes, obstructed devices, forensics procedures: preservation, acquisition, examination and analysis, reporting; SIM Card Forensics.

Network Forensics: sources of network based evidences, procedure for applying network based forensics, digital evidence on internet, digital evidence on physical and data link layers, digital evidence at the network and transport layers.

Unit IV : Security Issues and Principles:

Risk Analysis: Terms and Definitions, Need, Methodology, Considerations and Approaches.

Security Models: IA-CMM,ISM3, SSE-CMM: Importance, Usage, Structure and Architecture, Process Areas; Security Engineering and its need.

Security Standards and frameworks: ISO 27001: Evolution, Organizational Context, ISMS Implementation in Organizations; COBIT: Principles, Structure and Objectives.

Security Methodologies: IAM, IEM, OCTAVE, OSSTMM,SIPES.

Laws for Information Security: Introduction to The Indian IT Act, IPR, Patent law, Copyright Law.

Unit V : Security Audit/Assurance:

Security Audits : Need in Organizations, Auditor's responsibility, Types, Approaches, Technology- Based Audits : Penetration Testing and Vulnerability Scanning; Phases, Budgeting for Security Audits.

Privacy : Organizational implications, Practices ,Policy, Audits: Framework and Approach, Standards, Phases, Process : Design, Risk Analysis, Planning, Conducting, Reporting.

Course outcomes:**After the completion of course student will be able to:**

At the completing of the course, students will be able to understand the fundamental concepts of forensic science and digital forensics principles. Learn to identify importance of digital evidence.

Text and Reference books:

- [1] Nina Godbole, Information Systems Security-Security Management, Metrics, Frameworks and Best Practices, Wiley, 2009.
- [2] Digital Forensics and Cyber Crime; Ibrahim Baggili; Springer.
- [3] W. Kruse and J. Heiser, *Computer Forensics: Incident Response Essentials*, Massachusetts, Ed. Boston: Addison Wesley, 2001.
- [4] Rick Ayers, Sam Brothers and Wayne Jansen: Guidelines on Mobile Device Forensics, NIST, 2014.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME II Year Information Technology (Sp. Information Security) Semester- B				
Subject Code & Name	Instructions Hours per Week			Credits			
ISP3G2: Applied Cryptography	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objective:

To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Modular Arithmetic and Multiplicative Group

Modular Arithmetic for advanced cryptography, Multiplicative group of integers, order of an element in, generator of, extended Euclidean algorithm, Pohlig-Hellman and Pollard-Rho algorithm for computing DLP, Integer factorization problems, Pollard-Rho factoring algorithm.

Unit II : Tools for Symmetric key & Public key Cryptography

Shannon ciphers and perfect security, computational ciphers and semantic security, efficient adversaries and attack games, trapdoor function schemes, trapdoor function pair schemes, ElGamal cryptographic system, ElGamal digital signatures, fun applications.

Unit III : Block Ciphers and Their Attacks

Polynomial arithmetic, finite field $GF(2^n)$, constructing block cipher in practice, sophisticated attacks on block ciphers, case study block cipher AES: AES structure, AES transformation functions, AES key expansions, AES Implementation, fun applications.

Unit IV : Cryptanalysis, IDS and Attacks

Intrusion detection system (IDS), cross site scripting attacks, SQL injection attacks, fault injection attacks, side channel attacks, algorithmic attacks.

Unit V : Asymmetric Key Cryptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.

Learning Outcomes: After the completion of course student will be able to

Perform research activity related to various cyber attacks and will be able to develop some formula or algorithm to stop or minimize these attacks.

Text and Reference books:

- [1] Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC
- [2] Williams Stallings; "Cryptography & Network Security"; Pearson Education.
- [3] Mathew Bishop; Introduction to computer Security; Addison-Wisley
- [4] Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

ELECTRONICS ENGINEERING DEPARTMENT
ME PART TIME 3rd SEMESTER
SCHEME & SYLLABUS (DIGITAL INSTRUMENTATION)

Sub Code	Sub Name	L-T-P	Sub-Type
DIP3C1	Digital Image Processing	3-1-1	PC4
DIP3C2	Process Instrumentation & Industrial Control	3-1-1	PC5
DIP3GX	Generic Elective II	3-1-0	GE2
DIP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III		14 actual + 2 Virtual credits	

List Of Generic Electives

DIP3G1	Software Engineering	3-1-0	GE2
DIP3G2	Embedded RTOS	3-1-0	GE2
DIP3G3	Modeling and Simulation	3-1-0	GE2
DIP3G4	Industrial Communication	3-1-0	GE2

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIP3C1: Digital Image Processing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

COURSE CONTENTS

UNIT I

Introduction: Background, Digital Image Representation, Elements of a Digital Image Processing System. Data Acquisition Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, machband effect, Color image fundamentals RGB, HSI models, Image sampling, Quantization, dither.

Image Transforms: Geometric and spatial transforms Introduction to the Fourier Transform, The Discrete Fourier Transform, Properties of the Two-Dimensional Fourier Transform, Other Separable Image Transforms.

Unit II

Morphological Image Processing: Dilation and Erosion, Labelling connected components, Morphological Reconstruction, Gray-scale morphology, Image descriptors: Region and boundary extraction, Image representation: Chain code, boundary, skeletons, signature descriptors: shape numbers, Fourier descriptors, statistical moments, corner, Regional descriptors, PCA

Unit III

Image Enhancement and segmentation:

Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Low-pass Filtering, High-pass Filtering, Generation of Spatial Masks from Frequency Domain Specifications. point, line, Edge detection, line detection using Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds

Unit IV

Image Restoring: Degradations Model - Definitions, Noise Models, Diagonalization of Circulant and Block- Circulant Matrices, Circulant Matrices, Block Circulant Matrices, Effects of Diagonalization on the Degradation Model, Restoration approach, Unconstrained Restoration, Constrained Restoration, Inverse Filtering – Formulation, Removal of Blur Caused by Uniform Linear Motion, Restoration in the Spatial Domain, Geometric Transformation.

Unit V

Image Compression: Fundamentals, Types of Redundancy, Fidelity Criteria. Image Compression Models, The Source Encoder and Decoder, The Channel Encoder and Decoder. Elements of Information Theory Error-Free Compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression, Lossy Predictive Coding, Transform Coding.

Learning Outcomes

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study image restoration procedures.

4. To study the image compression procedures.

TEXT AND REFERENCE BOOKS:

- [1] Rafael. C. Gonzalez & Richard E.Woods.- Digital Image Processing, 2/e Pearson Education, New Delhi - 2006
- [2] W.K.Pratt.-Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006
- [3] A.K. Jain-Fundamentals of Digital Image processing- PHI, New Delhi(1995)
- [4] M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester-B				
Subject Code & Name		Instructions Hours per Week			Credits			
DIP3C2: Process Instrumentation and Industrial Control		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of paper: 3 Hours								

Course Objective:

- To enable students to understand the basic concept of process instrumentation applicable in various industries. It will also give in depth knowledge regarding different type of control strategies instrumentation and controller used in processing industries.

COURSE CONTENT

Unit I

Fundamentals of Process Control

Elements of process control loop, concept of process variables, set point, controlled variable, manipulated variable, load variable. Need for standardization of signals, current, voltage and pneumatic signal standards, concept of live & dead zero, Difference between converter & transmitter, Pneumatic to current converter, Current to pneumatic converter .

Unit II

Types of Control Actions:

Discontinuous:ON/OFF, Continuous: Proportional, integral, derivative, proportional-Integral, Proportional- Derivative, Proportional-Derivative-Integral

Tuning of Controller:

Quarter Amplitude Decay Ratio, Loop disturbance, optimum control, Measure of quality, stability criteria, Tuning methods: Process Reaction Curve (open loop), Ziegler Nichols (closed loop), set point tuning Vs load disturbance tuning.

Unit III

Programmable Logic Controller (PLC):

Continuous versus Discrete Process Control, ladder diagram using standard symbols, Architecture of PLC, PLC ladder diagram and instructions, PLC Programming for process applications.

Complex Control Systems:

Introduction, cascade, feed forward, Ratio Control, Anti Reset, Selector & Multivariable control scanners.

Unit IV

Control valve:

Classification of control valves based on: Valve body. Construction, type of actuation, application etc. Control valve terminology: Range ability, turndown, valve capacity, Air to open, Air to close, valve gain etc. Control valve characteristics: Inherent & installed Control valve accessories. Types of actuators. Positioners: Application/Need, Types, Effect on performance of control valves.

Unit V

Safety and Hazards:

Explosion Proof Housing, Encapsulation, Sealing, & Immersion, intrinsic safety, Concept of safety cycle.

DCS and SCADA:

DCS architecture, system elements of DCS. Definition of SCADA, Application area of SCADA, Major elements of SCADA, Advantages and disadvantages of SCADA, Comparison of SCADA, DCS, PLC and Smart Instrumentation.

Learning Outcomes

1. Understand the basic principles & importance of process control in industrial process plants;
2. Specify the required instrumentation and final elements to ensure that well-tuned control is achieved;

Text Books and References:

- [1] Curtis Johnson, "Process Control and Instrumentation Technology", Prentice-Hall of India Seventh ed., 2005.
- [2] B. G. Liptak, "Process Control, Instrument Engineering Hand book", Chilton Book Company, Third ed., 1995
- [3] Dobrivoje Popovic and Vijay Bhatkar, "Distributed Computer Control for Industrial ", Marcel Dekker

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DIP3G1: Software Engineering		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Course Objectives:

- The main purpose of this course is to impart knowledge on the basic principles of software development life cycle.

Prerequisites:

Knowledge of Basic Data Types - Lists, Stacks, Queues, Hash Tables ,Trees - Binary Trees, Tree Traversal, Memory Management - Storage Allocation, Garbage Collection, Algorithms - Divide and Conquer, Backtracking, Iterative Techniques, Searching and Sorting, Complexity - O-Notation

COURSE CONTENTS

Unit I - Introduction

Software Engineering-Software Process- Generic process model-Prescriptive process model-specialized, unified process-Agile development-Agile Process- Extreme Programming- Other agile Process models-Software engineering Knowledge-core Principles-Principles that guide each framework Activity.

Unit II-Requirements

Requirements Engineering-Establishing the Groundwork-Eliciting Requirements- Developing use cases- Building the requirements model-Negotiating, validating Requirements-Requirements Analysis-Requirements Modeling Strategies.

Unit III-Design modeling with UML

Modeling Concepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams - Diagram Organization- Diagram Extensions. Design Process- Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes- Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements .

Unit IV-Software implementation

Structured coding Techniques-Coding Styles-Standards and Guidelines- Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling- Concurrency Mechanism.

Unit V-Testing and Maintenance

Testing: Software Quality- Software Quality Dilemma- Achieving Software Quality- Testing: Strategic Approach to software Testing- Strategic Issues- Testing: Strategies for Conventional Software, Object oriented software, Web Apps-Validating Testing- System Testing- Art of Debugging.
Maintenance: Software Maintenance-Software Supportability- Reengineering- Business Process Reengineering- Software Reengineering- Reverse Engineering- Restructuring- Forward Engineering- Economics of Reengineering

Course Outcomes:**After the completion of course student will be able to:**

1. Understand the process of software development.
2. Learn the concept of change of request
3. Better understanding of the layering architecture

Text and Reference Books:

- [1] Roger S, "Software Engineering – A Practitioner's Approach", seventh edition, Pressman, 2010.
- [2] Pearson Edu, "Software Engineering by Ian Sommerville", 9th edition, 2010.
- [3] Hans Van Vliet, "Software Engineering: Principles and Practices", 2008.
- [4] Richard Fairley, "Software Engineering Concepts", 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DIP3G2:Embedded Real Time Operating Systems (RTOS)		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Objective:

- Provide an understanding of general embedded system concept, Embedded Software development, RTOS essentials, advantages and trade-offs. It will provide practical experience necessary to use an RTOS in an embedded system development

Prerequisites: Operating system, Microcontrollers and C Programming

COURSE CONTENTS

Unit I

Introductio

Introduction to UNIX/LINUX, Overview of Commands, File I/O (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

Unit II

Real Time Operating Systems

Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

Unit III

Objects, Services and I/O

Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

Unit IV

Exceptions, Interrupts and Timers

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit V

Case Studies of RTOS

RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

Course Outcomes:

After the completion of course student will be able to:

1. Understand the Real time concept for Embedded system..
2. Develop various hardware and software merged applications.
3. Better understanding of Interrupts, timers, component configurations for research and development.

Text Books and References

- [1] Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011
- [2] Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
- [3] Advanced UNIX Programming, Richard Stevens
- [4] Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaug

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DIP3G3:Modelling and Simulation	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objectives:

- To give exposure of stochastic processes and to show their importance in engineering education and research. To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give hands on experience in MATLAB to be used as a simulation tool for the stochastic processes. To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of probability theory.

COURSE CONTENTS

Unit I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

Unit II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernouli pmf, Binomial pmf, Geometric pmf, Poisson pmf, Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable.

Unit III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

Unit IV

Markov Processes -Introduction to Continuous Time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poisson Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

Unit V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

Course Outcomes:

After the completion of course student will be able to:

1. Develop application based on the research work using MATLAB.
2. Enhance research oriented work.
Better understanding of Markov Chains for research and development

Text and Reference Books:

- [1] S.M. Ross, "Introduction to Probability Models, 9th Edition, Elsevier Publication" 2007.
- [2] K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition, A Wiley-Interscience Publication.
- [3] Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition, TataMcGraw-Hill Publication.
- [4] A Papoulis, S.V Pillai, "Probability Random Variables and Stochastic Processes", 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DIP3G4: Industrial Communication		L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Objective:

- The focus of the course is on the protocols, algorithms and tools needed to support the development and delivery of advanced Industrial network for Control and communication

Prerequisites: Programming ability and an understanding of basic networking, OS, and architecture issues.

COURSE CONTENTS

Unit I

Historical Overview of Industrial Automation and Communication Networks, Hierarchical Levels in Industrial, Communication Networks, Transmission Methods, Industrial Network Components, Network Topology.

Serial Communication Standards: Standards organizations, Serial data communication interface standards, Balanced and unbalanced transmission lines, Synchronous & asynchronous communication, RS 232,422,485 interface standards and Troubleshooting.

Parallel Communication Standards : Parallel data communications interface standards - General purpose interface bus (GPIB) or IEEE - 488, The Centronics interface standard, The universal serial bus (USB), Different configuration modes - two wire & four wire point - to -point & multidrop connections.

Unit II

HART Communication protocol - Evolution of signal standards, features of HART protocol, Communication modes, HART networks, HART Data format or telegram structure, field device & Control system interface to HART bus, HART cabling considerations, HART commands and types, HART field controller implementation, 3 layers of HART-OSI model, DDL and compatibility, Advantages and applications of HART protocol.

Unit III

Field Bus: Basics, Architecture, OSI -model, FF/Foundation FB segments, interconnection type - distributed and Chicken foot, FFB types -H1 & HSE, Network design and system configuration, General considerations, advantages of FB & Foundation FB and their comparison.

Unit-IV

Controller Area Network DeviceNet, CANopen, Interbus, Actuator Sensor Interface (AS-I), ControlNet.

Unit-V

An Introduction to Industrial Ethernet Ethernet's Roots', Ethernet Physical Layer, Data Link Layer, The Ethernet Frame, Hubs and Switches, Higher Level Network Functions, Ethernet and Industrial Systems, Industrial Ethernet communication protocols

Course Outcomes: After the completion of course student will be able to:

1. Develop algorithms and tools based on the research work for various industry.
2. Enhance research oriented work.
3. Better understanding of Basics, Architecture, OSI -model for research and development work

Text Books and References:

- [1] Steve Mackay, John Park and Edwin Wright, "Practical Data Communication for Instrumentation and Control", Newnes Elsevier, 2002.
- [2] David Bailey and Edwin wright , "Practical SCADA for industry", Newnes Elsevier.
- [3] Romilly Bowden, 'HART application Guide', HART Communication Foundation, 1999.

ELECTRONICS ENGINEERING DEPARTMENT
ME PART TIME 3rd SEMESTER
SCHEME & SYLLABUS (DIGITAL COMMUNICATION)

Sub Code	Sub Name	L-T-P	Sub-Type
DCP3C1	Modelling and Simulation	3-1-1	PC4
DCP3C2	Mobile Communication Networks	3-1-1	PC5
DCP3Gx	Generic Elective II	3-1-0	GE2
DCP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III		14 actual + 2 Virtual credits	

List Of Generic Electives

DCP3G1	Broadband Access Technology	3-1-0	GE2
DCP3G2	Nanodevices & Nan sensors	3-1-0	GE2
DCP3G3	Advance Antenna System	3-1-0	GE2
DCP3G4	Industrial Communication	3-1-0	GE2

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week		Credits				
DCP3C1 Modeling and Simulation		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Course Objectives:

- To give exposure of stochastic processes and to show their importance in engineering education and research to develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes to develop an orientation towards research in electronics and computer engineering.
- **Prerequisite(s):** Fundamental knowledge of Probability Theory.

COURSE CONTENTS

UNIT –I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernoullipmf, Bionomialpmf, Geometric pmf, Poisson pmf, ContinuousRandom Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and its Expectation, Jointly Distributed Random Variable.

UNIT –III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes -Introduction to Continues Time Markov Chains, Birthand Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

Course Outcomes:**After the completion of course student will be able to**

1. Will have exposure of stochastic processes and to show
2. Will develop skills to identify a process, its inputs and outputs.
3. Able to develop a model and quantify the results.
4. Will have hands on experience in MATLAB to be used as a simulation tool for the stochastic processes
5. Will have an orientation towards research in electronics and computer engineering.

BOOKS RECOMMENDED

- [1] S.M. Ross, "Introduction to Probability Models, 9th Edition, Elsevier Publication", 2007.
- [2] K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition , A Wiley-Interscience Publication.
- [3] Averill M. Law,W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition, Tata McGraw-Hill Publication.
- [4] A Papoulis, S.VPillai, "Probability Random Variables and Stochastic Processes", 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions			Credits			
		Hours per Week						
DCP3C2	L	T	P	L	T	P	Total	
Mobile Communication Networks	3	1	2	3	1	1	5	
Duration of Theory Paper: 3 Hours								

Course Objectives:

- To provide the knowledge of cellular concept, types of wireless networks, different generation's mobile communication systems, and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite(s): Knowledge of digital communication, OSI Model and internet protocol.

COURSE CONTENTS

Unit 1

Evolution of Modern Mobile Wireless Communication Systems: Different types of Wireless Communication, Classification of Wireless Networks: Wireless Local Area Networks, Personal Area Networks, Fixed Wirelessli Access, Ad-hoc and Sensor Networks, Satellite Cellular Communication, First Generation, Second Generation, Third Generation wireless Networks, All-IP Networks, Requirements for services, Technical Challenges of Wireless Communications.

Unit 2

Cellular Systems Design Fundamentals: Multiple access Techniques, Cellular Structutre, Cell Cluster, Frequency Reuse, Co-channel and Adjacent channel Interference, Enhancement of system Capacity, Channel Assignment, Cellular Communication priciples, Mobility Management, Radio Resource Management, 1G AMPS system.

Unit3

2G and 2.5 G Systems: GSM system architecture, Air interface, Lgical and Physical Channels, Voice encoding, channel encoding, Cryptography, Frequency hopping, Equalization in GSM, Connection establishment and Handover, Protocols and Signaling, Services and Billing.

GPRS system architecture, Signaling, Roaming, Interfaces and Related Protocols, IP internetworking Model, GPRS applications.

Unit 4

3G Systems: WCDMA/UMTS: System Overview, Air Interfaces, Physical and Logical Channels, Speech coding, Multiplexing, Channel Encoding, Spreading, Modulation, Power control, Connection Establishment, Handover.

3GPP LTE: System Overview, Physical Layer, Logical and Physical Channels, Physical Laye Procedures.

Unit 5

IP for Mobile Networks: Overview of IP, IP Routing protocols, Basic Mobile IP, IP for GPRS and UMTS, Integration of different Technologies, Mobility management in Wireless Networks, All IP Networks, Key technologies for 4G.

Course Outcomes:

After the completion of course student will be able to

1. Having practical knowledge of cellular concept,
2. Learn about various types of wireless networks.
3. Learn about different generations mobile communication systems,.
4. Having the knowledge of various aspects of mobile radio environment.

BOOKS RECOMMENDED:

- [1] A. F. Molisch, "Wireless Communicatins", Second Edition, Wiley Publications, 2014.
- [2] I. S. Misra, "Wireless Communications & Networks", Second Edition, MGH, 2013.
- [3] J. Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.
- [4] T. S. Rappaport, Wireless Communications Principles & Practice, 2nd Edition, PHI, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCP3G1 Broadband Access Networks		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Course Objectives:

- To provide a detailed structure and working of different networks used for accessing broadband signals.

Prerequisite(s): knowledge of analog and digital communication and basic.s of computer networks

COURSE CONTENTS

Unit 1

Introduction: Broadband access, Its definition, coverage and economic impact, Legacy broadband technologies, Fixed wireline broadband technologies (Digital subscriber line, Cable modem, Broadband over power line), Fixed wireless broadband technologies (MMDS, Free space optics , Satellite) Mobile wireless broadband technologies (GPRS, EDGE, UMTS

Unit2

WLAN:Types, System architecture, Protocol Architecture, Medium access control CSMA/CA, Comparison of IEEE variants of WLAN (IEEE 802.11 – 802.11 ac), Frame formats, Modulation and coding, High Throughput WLANs., Wi-Fi based Wireless Mesh Networks.

Unit 3

WiMax: System Overview, Fixed Wi-Max, Mobile Wi-max, Physical Layer Overview (Modulation and coding, Physical and logical channels, Multiple antenna Techniques, Link Control), MAC Layer, Multihop relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks.

Unit 4

Optical Networking: Introduction and challenges- Advantages of optical network, WDM optical networks, WDM network evolution, WDM network construction, broadcast and select optical WDM network, wavelength routed optical WDM network, Challenges of optical WDMnetwork.**Optical Access Network** Introduction to access network, PON, EPON , GPON and WDM EPON: overview, principal of operation, architecture, standards; dynamic Bandwidth allocation and Quality of Service.

Unit 5

Optical switching & FiWi access networks Optical packet switching basics, slotted and unslotted networks, header and packet format, contention resolution in OPS networks, self routing, examples on OPS node architecture, optical burst switching, signaling and routing protocols for OBS networks, contention resolution in OBS networks, Radio over Fiber, Radio and Fiber, Integration of EPON and WiMax, Hybrid Wireless-Optical Broadband Access Network / Fiber wireless (FiWi) access network

Course Outcomes:**After the completion of course student will be able to**

1. Learn the concept of Fixed wireless broadband technologies (MMDS, Free space optics , Satellite) Mobile wireless broadband technologies (GPRS, EDGE, UMTS)
2. Can perform the Comparison of IEEE variants of WLAN (IEEE 802.11 – 802.11 ac).
3. Learn about various Frame formats, Modulation and coding.
4. Learn the features of Multichip relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks for practical implementation

BOOKS RECOMMENDED:

- [1] Optical Network Series: Biswanath Mukherjee, Springer, 2006.
- [2] Optical Networks: R.Ramaswami and K.Sivarajan, Morgan Kaufmann Publishers, 2nd ed., 2002.
- [3] A. F. Molisch, "Wireless Communicatins", Second Edition, Wiley Publications, 2014.
- [4] Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.
- [5] 3. Optical Switching Networks: Mayer & Martin, Cambridge University Press, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCP3G2	L	T	P	L	T	P	Total
Nanodevices & Nanosensors	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Course Objectives:

- This course will focus on understanding of the basic structure principals of Nano-devices and sensors.

Prerequisite(s): Introduce the quantum mechanical concepts needed to understand the operation

COURSE CONTENTS

Unit-I

QUANTUM DEVICES Quantum Electronic devices – Electrons in mesoscopic structures – Short channel, MOS Transistor – split Gate Transistor – Electron wave transistor – Electron spin transistor – Quantum Dot array – Quantum computer- Bit and Qubit. Carbon Nanotube based logic gates, optical devices. . Connection with quantum dots, quantum wires, and quantum wells

Unit-II

TUNNELING DEVICES Tunneling element – Tunnel Effect and Tunneling Elements- Tunneling Diode – Resonant Tunneling Diode – Three -Terminal Resonate Tunneling Devices- Technology of RTD-Digital circuits design based on RTDs - Basics Logic Circuits – Single Electron Transistor(SET)

– Principle – Coulomb Blockade- Performance – Technology- Circuit Design- Logic and Memory Circuits – SET adder as an Example of a Distributed Circuit.

Unit-III

NANOSENSORS I Micro and nano-sensors, Fundamentals of sensors, biosensor, micro fluids, Packaging and characterization of sensors, Method of packaging at zero level, dye level and first level. Sensors for aerospace and defense: Accelerometer, Pressure Sensor, Night Vision System, Nano tweezers, nano-cutting tools, Integration of sensor with actuators and electronic circuitry,

Unit-IV

NANOSENSORS II Sensor for bio-medical applications: Cardiology, Neurology and as diagnostic tool, For other civil applications: metrology, bridges etc. Biosensors. Clinical Diagnostics, generation of biosensors, immobilization, characteristics, applications, conducting Polymer based sensor, DNA Biosensors, optical sensors. Biochips. Metal Insulator Semiconductor devices, molecular electronics, information storage, molecular switching, Schottky devices,

Unit-V

NEMS Inertial sensors – accelerometer – gyroscope - micromechanical pressure sensors – pizo-resistive –capacitive - microrobotics – micro channel heat sinks – optical MEMS – visual display

– precision optical platform – optical data switching – RF MEMS – MEMS variable capacitors – MEMS switches – Resonators.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Quantum computer- Bit and Qubit. Carbon Nanotube based logic gates, optical devices.,
- Practical appoces using Digital circuits design based on RTDs - Basics Logic Circuits
- Learn how to use Accelerometer, Pressure Sensor, Night Vision System, Nano tweezers, nano-cutting tools.
- Can perform Integration of sensor with actuators and electronic circuitry.
- Learn the features of Metal Insulator Semiconductor devices, molecular electronics, information storage, molecular switching, Schottky devices,

BOOKS RECOMMENDED:

1. K. Goser, P. Glosekotter and J. Dienstuhl, “Nanoelectronics and Nanosystems-From Transistors to Molecular Quantum Devices” , Springer, 2004.
2. HerveRigneault, Jean-Michel Lourtioz, Claude Delalande, Ariel Levenson, “Nanophotonics”, ISTE.
3. W.R.Fahrner, “Nanotechnology and Nanoelectronics – Materials, Devices and Measurement Techniques” Springer, 2006 13
4. Nano Engineering in Science &Technology : An introduction to the world of nano design by Michael Rieth.
5. Tai –Ran Hsu, “MEMS & Microsystems Design and Manufacture”, Tata McGraw-Hill publication, 2001.
6. P. Rai-Choudhury, “MEMS and MOEMS technology and applications”, PHI learning private Ltd, 2009.
7. Mohamed Gad-el-Hak, “The MEMS Handbook”, CRC Press, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
DCP3G3	L	T	P	L	T	P	Total
Advance Antenna System	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives:

- Achieve the skill to analyze and design advanced antennas and antenna systems using numerical techniques

Prerequisites: Electromagnetic field theory.

COURSE CONTENTS

UNIT I

Fundamental Concepts:

Physical concept of radiation, Radiation pattern, near- and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

UNIT II

Radiation from Wires and Loops:

Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

UNIT III

Aperture Antennas:

Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts.

Broadband Antennas:

Broadband concept, Log-periodic antennas, frequency independent antennas.

UNIT IV

Microstrip Antennas:

Basic characteristics of microstrip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Antenna Arrays:

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays.

UNIT V

Basic Concepts of Smart Antennas: Concept and benefits of smart antennas, Fixed weight beamforming basics, Adaptive beamforming

Course Outcomes:

After the completion of course student will be able to

- Learn the Physical concept of radiation, Radiation pattern.
- Having deep knowledge of finite-length dipole, linear elements .
- Practical approach of Huygens' principle,.
- Learn concept of radiation from rectangular and circular apertures.
- Perform Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays.
- Learn the Concept and benefits of smart antennas, Fixed weight beam forming basics, Adaptive beam forming

Books Recommended:

- [1] C.A. Balanis, "Antenna Theory and Design", 3rd Ed., John Wiley & Sons., 2005.
- [2] W. L. Stutzman, and G. A. Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons., 1998.
- [3] R. S. Elliot, "Antenna Theory and Design", Revised edition, Wiley-IEEE Press., 2003.
- [4] R. E. Collin, "Antennas and Radio Wave Propagation", McGraw-Hill., 1985.
- [5] F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill., 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP3G4	L	T	P	L	T	P	Total
Industrial Communication	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective:

- The focus of the course is on the protocols, algorithms and tools needed to support the development and delivery of advanced Industrial network for Control and communication

Prerequisites : Programming ability and an understanding of basic networking, OS, and architecture issues.

COURSE CONTENTS

UNIT-I

Historical Overview of Industrial Automation and Communication Networks, Hierarchical Levels in

Industrial, Communication Networks, Transmission Methods, Industrial Network Components, Network Topology.

Serial Communication Standards: Standards organizations, Serial data communication interface standards, Balanced and unbalanced transmission lines, Synchronous & asynchronous communication, RS 232, 422, 485 interface standards and Troubleshooting.

Parallel Communication Standards : Parallel data communications interface standards - General purpose interface bus (GPIB) or IEEE - 488, The Centronics interface standard, The universal serial bus (USB), Different configuration modes - two wire & four wire point - to -point & multidrop connections.

UNIT-II

HART Communication protocol - Evolution of signal standards, features of HART protocol, Communication modes, HART networks, HART Data format or telegram structure, field device & Control system interface to HART bus, HART cabling considerations, HART commands and types, HART field controller implementation, 3 layers of HART-OSI model, DDL and compatibility, Advantages and applications of HART protocol.

UNIT-III

Field Bus: Basics, Architecture, OSI -model, FF/Foundation FB segments, interconnection type - distributed and Chicken foot, FFB types -H1 & HSE, Network design and system configuration, General considerations, advantages of FB & Foundation FB and their comparison.

UNIT-IV

Controller Area Network DeviceNet, CANopen, Interbus, Actuator Sensor Interface (AS-I), ControlNet.

UNIT-V

An Introduction to Industrial Ethernet Ethernet's Roots', Ethernet Physical Layer, Data Link Layer, The Ethernet Frame, Hubs and Switches, Higher Level Network Functions, Ethernet and Industrial Systems, Industrial Ethernet communication protocols

Course Outcomes:

After the completion of course student will be able to

- Learn various protocols, algorithms
- Use tools needed to support the development and delivery of advanced Industrial network for Control and communication.
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Books Recommended:

- [1] Steve Mackay, John Park and Edwin Wright, "Practical Data Communication for Instrumentation and Control", Newnes Elsevier, 2002.
- [2] David Bailey and Edwin Wright, "Practical SCADA for industry", Newnes Elsevier
- [3] Romilly Bowden, 'HART application Guide', HART Communication Foundation, 1999

MECHANICAL ENGINEERING DEPARTMENT
ME PART TIME 3rd SEMESTER
SCHEME & SYLLABUS (Industrial Engineering Management)

Sub Code	Sub Name	L-T-P	Sub-Type
IMP3C1	Financial Management	3-1-1 =5	PC4
IMP3C2	Materials Management	3-1-1 =5	PC5
IMP3Gx	Generic Elective II	3-1-0 =4	GE2
IMP3V3	Comprehensive Viva III	0-0-2=2	
Total Credit for SEM III		14 actual + 2 Virtual credits	

LIST OF GENERIC ELECTIVES II

IMP3G1	Project Management	3-1-0	GE
IMP3G2	Enterprise Resource Planning	3-1-0	GE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP3C1 FINANCIAL MANAGEMENT	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper:3							

Objectives and Pre requisites:

- To inbuilt the concepts of Financial management. To strengthen skills related to Accounting. Application of financial tools and techniques, helpful for financial planning Capital Budgeting and Decision Making.

COURSE CONTENTS

UNIT-1

Nature and Scope of Financial Management:

Role of financial management in business decisions, goals of financial management, evolution of corporate finance, finance function, broader applicability of financial management concepts, tasks of finance controller.

UNIT-2

Book Keeping and Accounting:

Introduction of book keeping. Accounting Process & its concepts, Introduction & working knowledge of different books of account. Preparation of Financial Statements of the firm.

UNIT-3

Tools of Financial Analysis:

Funds flow analysis – sources and use of funds, balance sheet and profit and loss statements, measurement of cash flows, revenue cost, profit relationship, break even analysis, ratio analysis, analysis of operating and financial leverages, long term and short term cost out put relationship.

UNIT-4

Financial Planning:

Financial forecasting, forecasting techniques, criterion for investment decisions, dividend policy, cost of capital problems of financial planning and budgeting in public sector undertaking.

UNIT-5

Financial Budgeting:

Capital budgeting, capital budgeting, capital rationing, sources of rising fixed and working capital, management of working capital, internal financing, balanced capital structure,

Course outcomes

After completing the course the student will able to:

- Practical implementation of Accounting Procedure and Book Keeping.
- How to prepare different Financial Statements.

- Make understating of Ratio Analysis.
- Learn the process of internal financing, balanced capital structure,
- .Financial forecasting, forecasting techniques
- Funds flow analysis – sources and use of funds, balance sheet and profit and loss statements

BOOKS RECOMMENDED:

[1] Kuchchal, *Financial management*. Tata McGraw Hill, 2003

[2] Chandra Prasanna, *Financial management*. Tata Mc.Graw Hill, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP3C2 MATERIALS MANAGEMENT	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: To inbuilt the concepts of Material handling and purchase procedure of an organization. To impart the basics of standardization & stores management within an organization. To concrete the concepts of inventory management for effective decision making related to material & inventory.

COURSE CONTENTS

UNIT-1

Introduction:

Objective of materials management, field and scope of material management, general analysis material quality, material planning programming.

UNIT-2

Standardization: Concepts and Procedure,
Simplification: Concepts and Procedure,
Codification: Concepts and Procedure.

UNIT-3

Purchase Management:

Problems of purchasing , organization of purchasing Deptt, purchase procedures , placing of orders , inspection and testing , purchasing for mass production , purchase contract , make or buy decision , material import , DGS & D rate contract.

UNIT-4

Stores Management:

Stores organization, methods of storing, record – keeping & checking, issue methods, stores layout.

UNIT-5

Inventory Management:

Various inventory models, quantity discounts, shortages, instantaneous production with back orders, fixed time mode, single period model of profit maximization with time independent costs, lead time , re-order point , Buffer stock, models with price breaks, selective control of inventory, POQ system.

Course outcomes

After completing the course the student will able to:

- Learn about field and scope of material management,
- Learn about Standardization: Concepts and Procedure,

- Simplification: Concepts and Procedure,
- Codification: Concepts and Procedure.
- Get deep knowledge of Problems of purchasing, organization of purchasing Deptt.

BOOKS RECOMMENDED:

[1] Lee & Dobler, *Material management*. Tata Mc.Graw Hill, 1990

[2] Arnold J.R Tony & Stephen N. Chapman, *Introduction to Material management*. 2003

[3]. Gopal Krishnan, *Material Management*.1992

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP3G1 PROJECT MANAGEMENT	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites:

- To develop the Knowledge & concepts of Project Management. To develop the of Project's Analysis on different criteria like Market potential, Technical & Financial Analysis. To develop the skills of Project Appraisal through different criteria.

COURSE CONTENTS

UNIT-1

Project Management:

Definition characteristics and life cycle, difference with operation s management, steps in PM, projects managers jobs organization for PM, critical chain concepts.

UNIT-2

Market Potentiality & Technical Analysis:

Identification of opportunities of new products.

Materials and input production technology, product mix, plant capacity, project planning and analysis tools.

UNIT-3

Financial Analysis:

Estimation of cost of project, means of finance, estimate of working capital, estimate of cost of production, working result & profitability, projected balance sheet and projected cash flow statements. Project Appraisal Criteria: Payback period, net present value methods, cost benefit analysis, internal rate of return.

UNIT-4

Project Management through Network:

Work break down structure, Gantt chart etc. PERT: - Activity average time variance and project completion time by normal distribution. CPM: - Critical path, floats their interpretation, event occurrence time, slacks, resource allocation, crashing of NW, time cost trade-off, resource smoothing and leveling.

UNIT-5

Monitoring and Control:

Features of control, project control, performance analysis and cost control curves, line of balance, GERT, computer applications.

Course outcomes

After completing the course the student will able to:

1. Will able to make performance analysis and cost control curves
2. With critical chain concepts.
3. Learn about various Materials and input production technology
4. Learn about Payback period, net present value methods,
5. Work break down structure, Gantt chart etc. PERT:

BOOKS RECOMMENDED:

- [1] Chandra Prasanna, *Project preparation*, Tata Mc.Graw Hill publishing CO. 1, New Delhi
- [2] Jain D.K, *Project planning and appraisal in planned economy*, Uppal publishing house, New Delhi.
- [3] Lock Dennis, *Project management*, Galgotia book service, New Delhi.
- [4] Mohsin M., *Project planning and control* Vikas publishing house, New Delhi.
- [5] Sonha A.K and Sinha Ram, *project engineering and management*, Vikas publishing house, New Delhi.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
IMP3G2 ENTERPRISE RESOURCE PLANNING	L	T	P	L	T	P	Total
	3	1	1	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Prerequisites:

To impart the basics of Enterprise Resource Planning (ERP) 7 its implementation methodologies to the students

COURSE CONTENTS

Unit - 1

Introduction:

ERP: an over view, Benefits of ERP, REP and related technologies, Business Process Reengineering, Date warehousing, Data Mining, Online Analytical processesing (OLAP), Supply Chain Management.

Unit – 2

ERP Implementation:

ERP implementation Life cycle, Implementation Methodology, Not all packages are created equal, ERP Implementation Hidden Costs, Organizing the implementation, Vendors, Consultants and Employees.

Unit – 3

The Business Modules:

Business Modules in an ERP Package, Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales & Distribution.

Unit – 4

The ERP Market:

ERP Market place, SAP AG, PeopleSoft, Bann Company, Orcale Corporation. QAD, System Software Associates, Inc. (SSA).

Unit - 5

ERP – Present & Future:

Turbo Charge the ERP System, Enterprise Integration Applications (EIA), ERP and E – Commerce, ERP & Internet, Future Directions in ERP.

Course outcomes

After completing the course the student will able to:

- Learn About Supply Chain Management.
- Having deep knowledge of Date warehousing, Data Mining
- Learn the process of ERP implementation Life cycle
- Make a practical implementation of Business Modules using ERP Package

BOOKS RECOMMENDED:

- [1] Leon Alexis, ERP Demystified, Tata McGraw – Hill, 1e,2004.
- [2] Garg V.K. & N.K. Venkitakrishnan ERP Ware: ERP Implementaion Framework, PHI, 4e,2004.

MECHANICAL ENGINEERING DEPARTMENT
ME PART TIME 3rd SEMESTER
SCHEME & SYLLABUS (Design and thermal)

Sub Code	Sub Name	L-T-P	Sub-Type
DTP3C1	Machinery Fault Diagnosis and Signal	3-1-1 =5	PC4
DTP3C2	Advanced Refrigeration and Air Conditioning	3-1-1 =5	PC5
DTP3Gx	Generic Elective II	3-1-0 =4	GE2
IMP3V3	Comprehensive Viva III	0-0-2=2	
Total Credit for SEM III			14 actual + 2 Virtual credits

LIST OF GENERIC ELECTIVES II

DTP3G1	Advance Heat Transfer	3-1-0	GE
DTP3G2	Rapid Prototyping	3-1-0	GE
DTP3G3	Cogeneration and Waste Heat Recovery	3-1-0	GE
DTP3G4	Mechatronics in Manufacturing Systems	3-1-0	GE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
<i>DTP3C1</i> MACHINERY FAULT DIAGNOSIS & SIGNAL PROCESSING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective & Pre requisites:

- The basic objective of the subject is to deal with the analysis of faults generated inside the machine during the operations. The subject provides the basic knowledge of the methods used for the prevention of the faults and also the approach for analyzing the signals generated during the faulty condition of the machine. The Pre requisites are Tribology and Vibration.

UNIT- 1

Introduction to Diagnostic Maintenance and Condition Monitoring:

Introduction to condition based maintenance, applications and economic benefits, signature analysis-online & offline technique, various condition monitoring techniques, levels condition monitoring, fault detection and diagnosis.

UNIT- 2

Fault Diagnosis using Vibration Monitoring:

Vibration monitoring and analysis, shock pulse methods, noise monitoring, envelope detection technique, types of vibration test, field balancing, case studies on vibration based condition monitoring.

UNIT- 3

Noise Monitoring & Control:

Introduction to noise, properties of noise, loudness and weighting networks, octave and FFT analysis, impulsive noise, instrumentation for noise measurement and analysis, sound power, sound intensity, noise source location, noise diagnostics, noise monitoring of machines with example, cepstrum analysis, noise control methods, maintenance and noise reduction, vehicle and machinery noise, noise standards, case studies.

UNIT-4

Advanced Methods of Condition Monitoring:

Oil analysis including wear debris and contaminant monitoring, performance monitoring, non-destructive techniques, IR-Thermography, ultrasonic monitoring, reliability centred maintenance, higher order spectrum/advanced signal processing.

UNIT- 5

Computer Aided Monitoring:

Application and choice of the methods, computer aided monitoring including experts system like artificial neural network, fuzzy logic and other optimizing techniques, practical applications and case studies on computer based condition monitoring.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Student will able to deal with the analysis of faults generated inside the machine during the operations. And will have knowledge of the methods used for the prevention of the faults and also the approach for

LABORATORY EXPERIMENTS:

1. Case studies based on vibration based condition monitoring.
2. Experimental analysis of Noise based condition monitoring.
3. Experimental analysis of faults using IR-Thermography.
4. Experimental analysis of faults using Non- Destructive methods.
5. Case studies on computer aided fault diagnosis.

BOOKS RECOMMENDED

- [1] Ramamurthy V., *Mechanical Vibration Practice with Basic Theory*, Narosa Publication House, New Delhi 1e, 2002.
- [2] Rao J S & Gupta K. *Introductory Course on Theory and Practice of Mechanical Vibration*, New Age Publisher, New Delhi, 2e, 2002
- [3] Rao J S, *Vibratory Condition Monitoring of Machine*, Narosa Publishing House, New Delhi, 1e, 2002.
- [4] Mishra R C & Pathak K., *Maintenance Engineering & Management*, Printice Hall of India, New Delhi, 1e, 2002.
- [5] Gopalkrishnan P. & Banerji AB, *Maintenance & Spare Part Management*, Printice Hall of India, New Delhi, 3e, 2002.
- [6] Hand Book of Condition Monitoring by BKN Rao, UK.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Design & Thermal Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
DTP3C2 Advanced Refrigeration and Air Conditioning	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives & Prerequisites:

- Advancements in Refrigeration and Air Conditioning Technologies. Fundamentals of Thermodynamics, Heat transfer, Refrigeration cycles, Psychrometry

COURSE CONTENT

UNIT-1

Advanced Vapour Compression Technologies:

Single Stage System; Multistage Refrigeration: Two-stage with given Intermediate Pressure, Optimum Interstage Pressure, Cascade Refrigeration System; Liquefaction of Gases: Linde–Hampson Cycle: Precooled Linde–Hampson Cycle; Claude’s Cycle; Energy and Exergy analyses.

UNIT-2

Advanced Vapour Absorption and other Technologies

Vapor Absorption Systems: Ammonia-Water, Three fluid, Water-Lithium bromide; Solar-Powered Absorption Refrigeration System, Multi Stage Absorption Systems, Energy and Exergy analyses of Vapour Absorption Systems.

UNIT-3

Load Estimation and Air Conditioning Systems

Psychrometry, Psychrometric Processes, Load Estimation, Air-conditioning Systems: Classification-All Air, Air and water, All water Systems; Decentralized Cooling and Heating; Individual systems; Evaporative; Dessicant; Thermal storage; Clean room; Space systems; Packaged; Central systems

UNIT-4

Fans and Duct Design

Fans: Classification, Performance Characteristics and selection; Flow basics: Continuity Equation, Bernoulli’s Equation, Flow head loss; Ducts: Types, pressure characteristics, system pressure loss; Duct design: Equal-friction, Constant-velocity method, Static regain method

UNIT-5

Controls

Control Loop and Control Methods; Control Modes: Two-position, Step and Modulating, Floating, Proportional; Proportional plus Integral (PI), Proportional-Integral-Derivative (PID); Controllers: Direct / Reverse acting, Pneumatic, electric, digital; Valves and actuator; Dampers

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO :

1. Understand Cascade Refrigeration System; Liquefaction of Gases
2. Understand Vapor Absorption Systems: Ammonia-Water, Three fluid, Water-Lithium bromide
3. Understand Decentralized Cooling and Heating; Individual systems; Evaporative; Dessicant; Thermal storage;
4. Understand Control Loop and Control Methods; Control Modes

LABORATORY EXPERIMENTS:

1. To calculate actual and ideal Coefficient of Performance of vapour compression trainer.
2. To calculate actual and ideal Coefficient of Performance of vapour Absorption System
3. To carry out various psychrometric process in Air-conditioning trainer.
4. To estimate the Heating and cooling load of an enclosure
5. To design a duct network for a given plan

BOOKS RECOMMENDED:

- [1] W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 4e, 1985
- [2] Prasad M, *Refrigeration and Air conditioning*, New Age International, 2e, 2011
- [3] Arora C P *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
- [4] W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
- [5] Shan Wang, *Handbook of Air-Conditioning and Refrigeration*, McGraw-Hill Book Company, 2e, 2000
- [6] McQuiston F C., Parker J.D. and Spitler J. D., *Heating, Ventilating, and Air-Conditioning Analysis and Design*, John Wiley & Sons, 6e, 2005

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E.(Design& Thermal) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
DTP3G1 Advanced Heat Transfer	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites:

- Advancements in the topics on Heat Transfer Engineering. Fundamentals of Thermodynamics, Heat transfer at Undergraduate level

COURSE CONTENT

UNIT-1

Steady State Unidirectional Heat Conduction with Heat Generation:

Heat flow through slab with heat generation, Heat flow through cylinder with heat generation, Dielectric heating, Heat conduction with heat generation when generation is a function of position, Heat conduction with heat generation when generation is a function of temperature, Steady state two dimensional heat conduction, Purpose of Insulation, Critical Radius of Insulation.

UNIT-2

Unsteady State Unidirectional Heat Conduction:

Unsteady state heating or cooling, Unsteady state heat conduction through finite slab with negligible thermal resistance, Unsteady state heat conduction through finite slab with thermal resistance, Heisler charts, Periodic heat flow.

UNIT-3

Thermodynamic Analysis of Heat Exchangers:

Introduction, Temperature distribution and heat flow, Overall heat transfer coefficient, Fouling of Heat Exchangers, Effectiveness method (NTU) to study the performance of Heat Exchangers, Second Law analyses of Counter and Parallel flow type Heat Exchangers (Exergy Analysis), Finite Time Thermodynamic (FTT) analyses of Heat Exchangers.

UNIT-4

Advanced Convection Principles

Conservation principles; Differential and Integral Equations of momentum and Energy for Laminar and Turbulent Boundary Layers; Heat Transfer in Laminar Internal and External Flows: Axial Variations of Surface temperature and Heat flux; Heat Transfer in Turbulent internal and External Flows.

UNIT-5

Advanced Radiation

Review of fundamentals; View factors: Definition and Evaluation, Area Integration, Contour Integration, View factor algebra, Inside sphere method, unit sphere method, Radiative Heat exchange between gray diffuse surfaces; solution methods for governing integral methods, Partially specular gray and nonideal surfaces.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Apply the concept of heat conduction with heat generation
- Basic understanding of Unsteady state heat conduction through finite slab with thermal resistance
- Learn the Effectiveness method (NTU) to study the performance of Heat Exchangers
- Learn Heat Transfer in Laminar Internal and External Flows

BOOKS RECOMMENDED:

- [1] Bergman T.L., Lavine A. S., Incropera F. P. and Dewitt D. P. , *Fundamentals of Heat And Mass Transfer*, John Wiley & Sons, 7e, 2011
- [2] Kreith F., Manglik R. M., and Bohn M. S., *Principles of Heat Transfer*, Cengage Learning, 7e 2011
- [3] Kays W., Crawford M., Weigand B., *Convective Heat and Mass Transfer*, McGraw-Hill Book Company, 4e, 2005
- [4] Modest M. F., *Radiative Heat Transfer*, McGraw-Hill, Inc. 1993
- [5] Bejan A, *Convective Heat Transfer*, McGraw-Hill Book Company, 4e, 2005

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year ME [PT] (Design & Thermal Engg.) Part Time					
Subject Code & Name	Instructions Hours per Week			Credits				
DTP3G2 RAPID PROTOTYPING	L	T	P		L	T	P	Total
	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objective: To understand the basics of non-conventional prototyping processes.

COURSE OF CONTENT

UNIT-1

Basic operation, Role of Rapid Prototyping and tooling in product development and simultaneous engineering, Applications.

Rapid Prototyping Processes

Principles of RP processes, Classification, Laminated object manufacturing, Fused deposition modeling, Sterolithography, Solid ground curing, Selective laser sintering - 3D printing.

UNIT-2

CAD Requirements in RP

Introduction, Data requirements, Solid modeling, Surface modeling, Geometric processing, Interface formats, Model preparation, Slicing, Support structures and machine instructions

UNIT-3

Materials for Rapid Prototyping Plastics, Resins, Metals, Ceramics, Selection of Materials for suitable processes, Advantages and limitations.

UNIT-4

Rapid Tooling Techniques Rapid tooling techniques such as Silicone rubber molding, Epoxy molding, Electroforming, Vacuum casting, Vacuum forming, Laminated metallic tooling, Direct metal laser sintering.

UNIT -5

Rapid Manufacture Introduction, Material and process controls for Rapid manufacture, Production economics, Implementation, Applications, automotive, aeronautical, space applications, additive manufacturing for construction industry, retail industry

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

1. Learn Prototyping and tooling in product development and simultaneous engineering
2. Learn modeling, Surface modeling, Geometric processing
3. Learn Rapid tooling techniques such as Silicone rubber molding

Text Books

- [1.] Pham, D.T., Dimov, S.S. (2001) Rapid Manufacturing, Springer-Verlag London Limited.
- [2.] Neil Hopkinson, Richard Hague, Philip Dickens (Editors) Rapid Manufacturing: An Industrial Revolution for the Digital Age, Wiley Publication, 2005.
- [3.] Rafiq I. Noorani, Rapid Prototyping: Principles and Applications, Wiley Publication, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTP3G3 COGENERATION AND WASTE HEAT RECOVERY	L	T	P	L	T	P	Total
	3	1	-	3	1	0	4
Duration of Theory Paper: 3 Hours							

COURSE CONTENT

Objective & Pre requisites:

- The objective of the subject is to provide an understanding of energy conservation in various thermal engineering applications. The Pre requisites are Thermodynamics, Fluid Mechanics and Heat Transfer.

UNIT- 1

Energy Usage and Conservation

Energy: forms and Conversion; Patterns of energy use; potential for energy conservation; optimum use of energy resources; total energy approach.

UNIT- 2

Thermodynamic Cycles and Cogeneration

Review of Various Thermodynamic cycles; Coupled cycles; Systems approach to a thermal engineering application based plants; combined plants and cogeneration systems.

UNIT- 3

Energy Storage

Energy Storage Systems: thermal electrical, magnetic and chemical energy storage systems, Need for energy storage; Utilization of industrial waste heat: gas-to-gas, gas-to-liquid and liquid-to-liquid heat recovery systems.

UNIT-4

Waste Heat Recovery

Heat Recovery systems; Recuperators and regenerators; heat pipes; waste heat boilers; fluidized bed heat recovery; shell and tube heat exchangers

UNIT- 5

Heat Recovery Sources

Sources of heat recovery; Prime mover exhausts; incineration plants; heat pump systems; thermoelectric devices. Utilization of low grade rejected heat from power plants.

COURSE OUTCOMES:**AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:**

1. Potential for energy conservation; optimum use of energy resources;
2. Coupled cycles; Systems approach to a thermal engineering application based plants
3. Utilization of industrial waste heat: gas-to-gas, gas-to-liquid and liquid-to-liquid heat recovery systems.
4. Heat Recovery systems;

BOOKS RECOMMENDED

[1] Reay, D. A., *Heat Recovery Systems*, London, 1979.

[2] Boyce, M, P.,. *Handbook for Cogeneration and Combined Cycle Power Plants*, ASME 2002

[3] Fin David, *Cogeneration: A Users Guide*, IET

[4] Daiment, *Energy Systems*, Longman, UK

DEPARTMENT OF APPLIED SCIENC
SCHEME & SYLLABUS
M. S. C. (Applied Mathematics- IIIrd semester)

S.No	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM3PC1	Topology	3-1-0	Core
2.	AM3PC2	Database Theory	3-1-0	Core
3.	AM3PC3	Mathematical Statistics	3-1-0	Core
4.	AM3SS2	Life Management Skills	2-0-0	Skill
5.	AM3GEx	Generic Elective II	3-1-0	Generic
6.	AM3PR3	Computer Lab-III (Research Tools)	0-0-2	Practical
7.	AM3CV3	Comprehensive Viva III	0-0-4	Viva
Total Credit for SEM III			20 actual + 4 virtual credits	
		List of generic Elective II	3-1-0	
1.	AM3GE1	OS/Microprocessor	3-1-0	
2.	AM3GE2	Integral Transforms	3-1-0	
3.	AM3GE3	Financial Management		

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name	Instructions Hours per Week			Credits			
AM3PC1: Topology	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To study the properties of space, dimension, and transformation that are preserved under continuous deformations including stretching and bending, but not tearing or gluing.
- It includes properties such as connectedness, continuity, compactness and boundary.

Prerequisites: Basics of sets and functions.

COURSE OF CONTENTS

UNIT I

Countable and uncountable sets, Axiom of choice, Cardinal numbers, Schroeder-Bernstein theorem, Cantor's theorem, continuum hypothesis, Zorn's lemma, Well-ordering theorem. Definition and examples of Topological spaces, Bases and subbases, relative topology, Kuratowski closure operator, neighbourhood systems. Closed sets and limit points, Closure of a set, Dense subsets, Interior, exterior and boundary of a subset, derived sets, continuous functions and homomorphism.

UNIT II

Connected spaces, Connectedness on the real line, Components, Locally connected spaces, Connectedness and product spaces.

UNIT III

Compactness, Continuous functions and compact sets, Basic properties of compactness, Compactness and finite intersection property, Sequentially and Countably compact sets, Local compactness, Countable compactness and Sequential compactness in metric spaces.

UNIT IV

First and second countable spaces, Lindelof's theorem, separable spaces, second countability and separability, Separation axioms. T_0 , T_1 , T_2 , T_3 , T_4 , their characterization and basic properties, Urysohn's lemma, Tietze extension theorem.

UNIT V

Nets and Filters: Definition of Net, topology and convergence of Nets, Filters and their convergence, Ultra filters and compactness

Learning Outcomes:

Upon completing the course, students will be able to:

1. Work with sets and functions, images and pre images, and you can distinguish between finite, countable, and uncountable sets.
2. Define and illustrate the concepts of the separation axioms, connectedness and compactness, and describe different examples distinguishing general, geometric, and algebraic topology.
3. Are familiar with the construction of the fundamental group of a topological space and applications to covering spaces and homotopy theory.
4. The student is able to apply his or her knowledge of general topology to formulate and solve problems of a topological nature in mathematics and other fields where topological issues arise.

BOOKS RECOMMENDED:

- [1] George F. Simmons, Introduction to topology and modern analysis, McGraw Hill Book Company Inc., 2004.
- [2] K. D. Joshi, Introduction to topology, Wiley Eastern, 1983.
- [3] James R. Munkres, Topology, Prentice-Hall of India, 2nd Ed., 2000.
- [4] K. P. Gupta, Topology, Pragati Prakashan, 2006.
- [5] H.K. Pathak, Topology, Shiksha Sahitya Prakashan , Meerut, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name		Instructions Hours per Week			Credits			
AM3PC2:	Database	L	T	P	L	T	P	Total
Theory		3	1	-	3	1	-	4
Duration	of Theory							
Paper:								
3 Hours								

Learning Objectives:

- The course aims to familiarize the students with Database Management System
- To develop skill for developing and managing database applications.
- Define the terminology, features, classifications, and characteristics embodied in database systems.
- To provide an understanding of the relational data model.
- Formulate, using relational algebra, solutions to a broad range of query problems.

Prerequisite(s): Knowledge of lists, hash tables, arrays, search trees and programming experience.

COURSE OF CONTENTS

UNIT-I

Database Environment: Basic concepts, Comparison with Traditional file processing system, Merits & demerits of database approaches, Ranges of Database applications; Components of Database Environment;

Database Development Process: Systems development process, Three-Schema Architecture for Database Development.

UNIT-II

Database Analysis: Business Rules; E-R Model Construct; Cardinality Constraints; Enhanced E-R Model & business Rules, Modeling Enhanced relationship – Specialization & Generalization, specifying constraints in Supertype/Subtype Relationship, Entity Clustering; Case Studies.

UNIT-III

Database Design: Relational Data Model – Codd's Rules, Integrity Constraints; Transforming EER Diagram into Relations; Functional Dependencies. Normalization and Denormalization.

Physical Database Design: File Organization, Physical Database Design Process, Index - Primary Key Index; Secondary Key Index; When to use Index; Improving file access performance; RAID Levels;

UNIT-IV SQL: DDL, DML, DCL commands; processing single Table, Processing Multiple Table, Join operations; **Advanced SQL:** PL/SQL Constructs – View, Triggers,

Cursor, Exception Handling and Routines; Embedded SQL and Dynamic SQL, Transaction Processing – Properties, Schedules & Serializability Issues.

UNIT-V

Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. **Calculus:** Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

Learning Outcomes:

Upon successful completion of the course, the student will be able to:

1. Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.
2. Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary.
3. Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.
4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
5. Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.
6. Use a desktop database package to create, populate, maintain, and query a database.
7. Demonstrate a rudimentary understanding of programmatic interfaces to a database and be able to use the basic functions of one such interface.

BOOKS RECOMMENDED:

- [1] J. Hoffer, M. Prescott, and F McFadden, Modern Database Management, 6/e, Pearson Education, 2006.
- [2] S. B. Navathe, R. Elmasri, S.K.Gupta, D.V.L.N. Somayajulu, Fundamentals of
- [3] A. Silberschatz, H. Korth, and S. Sudarshan, Database System Concepts, 5/e, McGraw-Hill, 2005.
- [4] C.J. Date, An Introduction to Database Systems, 7/e, Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name	Instructions Hours per Week			Credits			
AM3PC3: Mathematical Statistics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To equip the student with the mathematical theory of statistics underlying the modern practices and applications of statistics to engineering, physics & astronomy, quality assurance & reliability, drug development, public health & medicine, the design of agriculture or industrial experiments, experiments of psychology and so forth.
- To provide an understanding for the student on statistical concepts to include measurements of location and dispersion, probability, probability distributions,
- Sampling, estimation, hypothesis testing, regression, and correlation analysis, basic methods of statistical quality control and stochastic process.

Prerequisites: Knowledge of Elementary probability, matrices, determinants and statistics.

COURSE OF CONTENTS

UNIT I

Review of probability –Random variable and Distribution function. Marginal and joint Probability distribution, Mathematical expectation of sum and product of random Variables. Moments, Cumulates and their interrelationship. Moment generating function and cumulate generating function, Binomial Normal and Poisson distribution with their properties.

UNIT II

Correlation and Regression; definition, regression coefficient; lines of regression; partial and multiple correlations, concept of estimation, definition of unbiasedness, Consistency and Efficiency, Statistical Decision making: Risk function, loss function; baye's approach.

UNIT III

Theory of Sampling, Standard error, Population and Sample Survey Methods, Test of significance for Mean, Variance, Proportion and correlation Coefficient., Sampling distribution- Chi-square test, t-test and F-distribution, Test of Hypothesis, Type I and 4. Error, Neyman's Pearson's Carpell Pearson's Lemma for Best Critical Region, Construction of test for mean and variance based on Neyman's Pearson's Lemma.

UNIT IV

Analysis of variance for one and two way classified data, Statistical Quality Control, Definitions, Control Charts, process capability, Acceptance Sampling: Single, Double and sequential sampling plans, O.C. curves, producer's and consumer's risk, A brief idea of Taguchi method.

UNIT V

Stochastic Process: Classification of stochastic processes, Autocorrelation function Poissonian Process-Queuing and birth and death process; Markovian process. Renewal theory. Reliability: Basic Concepts, Evaluation of system reliability.

Learning Outcomes:

Upon completing the course, students will be able to:

1. To design experiments and surveys for efficiency to perform complex data management and analysis.
2. Provide a conclusion to the study including a discussion of limitations of the analysis.
3. To apply discrete and continuous probability distributions to various business problems.
4. Successfully relate theoretical concepts to a real-world problem.
5. Understand how a control chart is used to detect assignable causes and how to apply pattern analysis.
6. Apply essential stochastic modelling tools including Markov chains and queuing theory;
7. Students will execute statistical analyses with professional software.

BOOKS RECOMMENDED:

- [1] S.C.Gupta & V.K.Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons., 2000.
- [2] Freund John E, Mathematical statistics, PHI, N.D., 7th Ed., 2010.
- [3] Papoulis Athanasios & S. Unnikrishna Pillai, Probability, Random variables and stochastic processes, Mc-graw Hill Book Co., 4th Ed. 2002.
- [4] S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.
- [5] K. S. Trivedi, Probability and statistics with reliability, queuing, and computer science applications, John Wiley & Sons, 2006.
- [6] T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw-Hill Education, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name		Instructions Hours per Week			Credits			
AM3SS2:	Life	L	T	P	L	T	P	Total
Management Skills		2	-	-	2	-	-	2
Duration of Paper: 3 Hours	Theory							

Learning Objective:

- To make students aware of various skills that are needed to express themselves properly to the society such as social and thinking skills.
- To provide students the methods for self-analysis in order to improve themselves.
- To make students learn various leadership skills along with negotiation skills.

Pre-requisites: Nil.

COURSE CONTENTS

UNIT I

Personality: Defining Personality, Personality Determinants, Personality Traits, The Big 5 Model, Personality Attributes, Types of Personality, Personality Development.

Motivation- Maslow’s Needs Hierarchy, Theory X- Theory Y, Herzberg’s Two-factor theory, ERG theory, Vroom’s Expectancy theory

UNIT II

Life Skills for Personality Development: Life Skills- Generic, Problem Specific and Area Specific Skills, Types - Social Skills, Thinking Skills, and Coping Skills.

Social Skills and Negotiation Skills: Self-Awareness: Definition, Types of Self- Self Concept, Body Image, Self Esteem, Techniques used for Self Awareness-Johari Window, SWOT Analysis, Empathy- Sympathy, Empathy & Altruism, Interpersonal Relationship- Definition, Factors affecting Relationships.

UNIT III

Thinking Skills: Thinking, Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages, Problem Solving: Definition, Steps and Factors Influencing Problem Solving.

Perception& Decision Making: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping. Decision Making–Definition, Need, Process, Consequences.

UNIT IV

Coping Skills: Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Emotional Intelligence & EQ.

Coping Strategies: Coping with Stress, Definition, Stressors, Sources of Stress, the General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

UNIT V

Leadership: Definition of Leadership Classification: Types of Leaders and Styles of Leadership, Managerial Grid, Characteristics and Functions of Leadership Values and Ethics of Leadership.

Theories of leadership: Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory, Transformational Leadership Theory, Charismatic Theory.

Learning Outcomes:

1. Upon completion of the syllabus, students will be able to:
2. Understand how to think in logical way to take right decisions.
3. Various traits that separate leader from a non-leader; and develop these into self.
4. Understand basics of how emotions control our decisions and use them in a positive way.
5. Gain knowledge of how they could groom their personality by improving basic thoughts and skills.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [3] Kumar Mahi. Stress Coping Skills Ebook, Health & Medicine, Technology, 2009.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.
- [7] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name	Instructions Hours per Week			Credits			
AM3GE1: OS/Microprocessor	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objective:

- Aim of this course is to aware students about the hardware of computers, operating system management
- To provide the fundamentals of microprocessor 8085.

Prerequisite(s): Nil

COURSE OF CONTENTS

UNIT-I

Introduction to Operating System

Types of OS: Batch system, Multiprogramming, Time Sharing, Distributed & real time OS. Computer Structures and OS: System Architecture-I/O, Storage, Processor, System Components- OS Service, System Calls, Programs; System Design, Implementation and Generation, Case study.

UNIT-II

Process and Storage Management

Cooperation, Interprocess Communication. CPU Scheduling: Basic idea and Algorithms; Process Synchronization. Swapping, Segmentation, Paging and Contiguous Allocation. Virtual Memory: Demand Paging, Frame Allocation and Thrashing Demand Segmentation. File System: Access method, Directory Structure, File-System Management. Case study.

UNIT-III

I/O Management

I/O Interfacing, I/O Requests and Interrupts. Disk Management: Disk structure & Scheduling, Swapping and Stability Issues. Disk Reliability. Case Study.

UNIT-IV

Introduction of 8085 Microprocessor and Addressing Modes:

Architecture of 8085 processor. Register Architecture: Accumulator, Temporally Register and Flag Register. Program Counter, Stack pointer and Instruction register. Direct addressing mode and Register direct Addressing Mode. Register Indirect Addressing Mode, Immediate Addressing Mode and Implicit or Implied Addressing Mode.

UNIT-V

Processors and Memory Hierarchy: CISC & RISC Architectures – CISC Family – RISC, Scalar processors – Super Scalar Processors and their features – Very Long Instruction word Architecture vector & symbolic processors, Memory hierarchy

Learning Outcomes:

Upon completing the course, students will be able to:

1. Demonstrate understanding of the concept, structure and design of operating system and its impact on application system design and performance.
2. Understand how the operating system manages its resources.
3. Describe how computing resources (such as CPU and memory) are managed by the operating system, describe the basic principles used in the design of modern operating systems.
4. Summarize the full range of considerations in the design of file systems, summarize techniques for achieving synchronization in an operation system,
5. Compare and contrast the common algorithms used for both pre-emptive and non-pre-emptive scheduling of tasks in operating systems, such a priority, performance comparison, and fair-share schemes. Contrast kernel and user mode in an operating system.

BOOKS RECOMMENDED:

- [1] Silber Schatz and P.B. Galvin, Operating System Concepts, Addison Wesley, 1998.
- [2] P. K. Ghosh, P. R. Sridhar, 0000 to 8085, Introduction to Microprocessor PHI Learning Pvt. Ltd., 2009.
- [3] A.S. Godbole, Operating System, Tata McGraw Hill, 2005.
- [4] Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, Prentice Hall PTR, 2002.
- [5] W. Stallings, Operating systems, 4th Edition, Pearson Education, 2003.
- [6] Y C Liu and G A Gibson, Microcomputer Systems, PHI, 2nd, Ed., 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name	Instructions Hours per Week			Credits			
AM3GE2: Integral Transforms	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The goals for the course are to gain a facility with using the transform, both specific techniques and general principles, and learning to recognize when, why, and how it is used.
- Explain the concept of integral transforms, e.g., Laplace, Fourier transforms and the related inverse transforms by using the following Partial fractions method, Tables, Convolution theorems and apply these transformation for engineering problems

Prerequisites: Basics of Calculus.

COURSE OF CONTENTS

UNIT I

Laplace transforms: Definitions, properties, Laplace transforms of some elementary functions, Convolution Theorem, Inverse Laplace transformation.

UNIT II

Fourier transforms: Definitions, Properties, Fourier transforms of some elementary functions, Convolution theorems, Fourier transform as a limit of Fourier Series.

UNIT III

Application of Laplace Transform to differential equations, Application of Laplace Transform to integral equation, Application of Laplace Transform to initial and Boundary Value Problems. Application of Fourier Transform to initial and Boundary Value Problems, Finite Fourier Sine and Cosine Transform, Inversion, Operational properties Fourier transform.

UNIT IV

Hankel's Transform: Definition, properties, Parseval's theorem, Finite Hankel's transform, Application of Hankel's transform in initial and boundary value problems.

UNIT V

Mellin's Transform: Definition, Mellin's Inversion theorem, properties, Convolution theorem.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Gain a range of techniques employing the Laplace and Fourier Transforms in the solution of ordinary and partial differential equations.
2. Apply transform techniques to analyze continuous-time and discrete-time.
3. Use the Integral Transforms in Circuit Analysis.

BOOKS RECOMMENDED:

[1] Sneddon I., The Use of Integral Transforms, Tata McGraw Hill, 1979.

[2] Murray R. Spiegel, Laplace Transforms Schaum's Outline Of Theory and Problems Of Laplace Transforms, 1965.

[3] Ram P Kanwal, Linear Integral Equations, Academic Press, 1971.

[4] A. R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.

[5] J.K. Goyal and K. P. Gupta, Integral Transforms, Pragati Prakashan, Meerut, India, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			MSc – I Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- III				
Subject Code & Name	Instructions Hours per Week			Credits			
AM3GE3: Financial Management	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To give an in-depth knowledge of business finance and how they should be recorded, classified & interpreted to get a meaningful judgment of viability & decision making about the efficiently conduct of the business.
- To equip the students with the Financial Management methods & techniques and their application to business problems. The emphasis will be on the concepts and application rather than derivations. It also focuses on the critical elements of financial decision-making for organizations, including investment decisions, sources of finance, management of working capital and performance appraisal.

Prerequisite(s): Students must be aware about the basics terminology of financial accounting & Financial Statement.

COURSE OF CONTENTS

UNIT I

Scope of Financial Management, Time value of money: Introduction to various sources of finance Leverages, Meaning of leverage, Significance of operating & financial Leverage.

UNIT II

Capital Structure: Meaning of capital Structure Different Capital Structure Theories.

UNIT III

Working Capital Management: Concept of Working Capital, Management of cash Management of Inventories, Management of Account Receivable Management, Accountants Payable Over Trading and Under Trading.

UNIT IV

Long term investment Decision: Capital Budgeting, Cost Volume Profit Analysis.

UNIT V

Marginal Costing Introduction to marginal costing, Decision making in alternative, Choices, Dividend Policy in Practice.

Learning Outcomes:

Upon completing the course, students will be able to:

- [1] Describe the financial environment within which organizations must operate.
- [2] Critically evaluate the financial objectives of various types of organizations and the respective requirements of stakeholders.
- [3] Discuss the function of capital markets.
- [4] Explain alternative sources of finance and investment opportunities and their suitability in particular circumstances.
- [5] Assess the factors affecting investment decisions and opportunities presented to an Organization.
- [6] Select and apply techniques in managing working capital.
- [7] Analyze a company's performance and make appropriate recommendations.

BOOKS RECOMMENDED:

- [1] S. N. Maheshwari , Financial Management: Principles & Practice, Sultan Chand & Sons, 2013.
- [2] M.Y. Khan & P.K. Jain Financial Management, McGraw Hill Education; Seventh edition, 2017.
- [3] Arthur J. Keown, John D. Martin, J. William Petty & David F. Scott, Jr., Financial Management. Pearson Education, Limited, 2004.
- [4] I.M. Pandey, Financial Management, Vikas Publishing House, 11 Ed., New Delhi, 2015.
- [5] R.P.Rastogi, "Graded Problems and Solutions in Financial Management", Galgotia Publication, 5th Edition, New Delhi, 2000.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 17/12/2016

Department heads presented the syllabus and scheme of 4th Sem. Committee has approved the syllabus and scheme of 4th Sem, after thorough discussion, for following branches of BE, BE (Part Time- Mechanical), ME Regular, ME (Part Time) and MSc.;

- BE Mechanical Engineering
- BE Computer Engineering
- BE Electronics & Instrumentation Engineering
- BE Information Technology
- BE Electronics & Telecommunication Engineering
- BE Civil Engineering
- ME Computer Engineering with specialization in *Software Engineering*
- ME Information Technology with specialization in *Information Security*
- ME Electronics Engineering with specialization in *Digital Instrumentation*
- ME Electronics Engineering with specialization in *Digital Communication*
- ME Industrial Engineering & Management
- ME Mechanical Engineering with specialization in *Thermal & Design Engineering*



Dr. N. Sohani



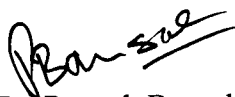
Dr. G.L. Prajapati



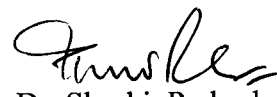
Dr. Ashesh Tiwari



Dr. Ravi Sindal



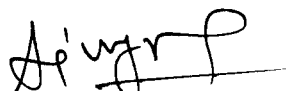
Dr. Pratosh Bansal



Dr. Shashi Prakash



Dr. Vrinda. Tokekar



Dr. Ajay Verma

S.V. Tokekar
17-12-16
Dr. Sanjiv Tokekar

**MECHANICAL ENGINEERING DEPARTMENT
SCHEME&SYLLABUS
IInd YEAR**

Semester-IV

S-NO	Sub Code	Sub Name	Type	L-T-P	Credits
1	MER4C1	INDUSTRIAL ENGG- & MANAGEMENT	PC	3- 1 - 0	4
2	MER4C2	THEORY OF MACHINE	PC	3- 1 - 1	4+1 (P)
3	MER4C3	MACHINE DESIGN & DRAWING	PC	3- 1 - 1	4+1 (P)
4	MER4C4	FLUID MECHANICS	PC	3- 1 - 1	4+1 (P)
5	MER4G2	MECHATRONICS	GE	3- 1 - 0	4
6	MER4L2	WORKSHOP / PRACTICAL (MECHATRONICS)		0- 0 - 1	1(P)
7	SMR4S4	ENGINEERING ECONOMICS		2- 0 - 0	2
8	MER4V4	COMPREHENSIVE VIVA-IV	VIRTUAL	0- 0 - 4	4
		TOTAL CREDITS			30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4C1	L	T	P	L	T	P	Total
INDUSTRIAL ENGG. & MANAGEMENT	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The basic objectives of the subject are:

- To understand fundamentals of industrial engineering management practices.
- To understand the linkages of concepts and organizational efficiency and effectiveness.
- To understand the concepts of productivity.
- To understand the basic concepts of quality and its management.

Prerequisites: Basic knowledge of engineering and English is pre requisites for this subject.

COURSE CONTENTS

UNIT-I

Methods Engineering: Introduction to Productivity and Methods Engineering, Methods study, Recording techniques, Work Measurement tool and techniques. Work place Design - Fundamental of Work place Design. Introduction to job Evaluation and Wage Incentive Schemes.

UNIT-II

Operations Management: Introduction to Operations management, manufacturing v/s service, Tools and Techniques. Types of Production system. Facilities planning, Introduction to plant layout.

UNIT-III

Organization and Management: Principles of Management and Management functions. Organization, Principles, Structures, Span of Control, Delegation, Centralization and Decentralization, Formal and Informal Organizations. Personal Management, Introduction, Communication, Motivation and Leadership.

UNIT-IV

Quantitative Techniques for Decision Making: Introduction to operation Research, Basic Transportation and Assignment Models and Their Applications, Network Techniques and its Applications.

UNIT-V

Quality Control:

Quality planning and quality control Programme. Economics of Quality Control and control chart for variables and attributes. Introduction to TQM.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- After studying this subject the students will be able to visualize the industrial operations with respect to Productivity.
- After studying this subject the students will be able to visualize Production Operations, Quality and Optimisation of industrial processes.
- This subject will help the student to understand the concepts of Industrial Engineering in higher semester of this course.

RECOMMENDED BOOKS:

- 1) Industrial Labour Organization (I.L.O.), *Work study*.
- 2) Monks, J.E. *Operations Management*, Mc. Graw Hills.
- 3) Hira and Gupta, *Operation Research*, S. Chand and Co, New Delhi.
- 4) Mahajan, *Statistical Quality Control*, Dhanpat Rai, New Delhi.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week		Credits				
MER4C2		L	T	P	L	T	P	Total
THEORY	OF	3	1	2	3	1	1	5
MACHINES								
Duration of	Theory							
Paper:								
3 Hours								

Learning Objectives:

- To provide the knowledge of basics of mechanisms(Gears, cams,etc), degrees of freedom.
- To give basic concepts of velocity and acceleration of mechanisms.
- To develop skill to analyze the behavior and applications of gear trains.
- To know the concept and effect of gyroscope.

Pre requisites: Engineering Mechanics, Engineering Physics, Engineering Mathematics.

COURSE CONTENTS

UNIT-I

Basics of Theory of Machines: Degree of Freedom (Grubler's criterion), Concept of mechanism, Inversions of Quadric cycle chain, single and double slider crank mechanism. Grashof's criterion, Types of kinematic synthesis, Synthesis of four bar function generator, Study of Straight line mechanisms (Paucellier, Tchebicheff's mechanisms), Steering Mechanisms (Ackerman's mechanism, Devi's Steering Gear mechanism). Hooke's joint and engine indicators.

UNIT-II

Velocity and Acceleration Analysis: Determination of velocity and acceleration by analytical and/or graphical methods of various mechanisms. Study of Coriolis components, Klein's construction.

UNIT-III

Cams and Followers : Types of Cams and followers, Cam profiles with specified follower motion e.g. simple harmonic, constant velocity and acceleration and deceleration, cycloidal types, Cams with specified contours. Tangent Cams, Displacement, Velocity and Acceleration of followers.

UNIT-IV

Gears and Gear Trains : Types of gears, Terminologies of various gears (Spur. Bevel gear, Helical gear, Worm and Worm wheel), Condition for correct gearing, Basics of gear meshing, Tooth profiles (cycloidal and involute). Gear trains, Epicyclic gear trains and their analysis.

UNIT-V

Gyroscopes: Product of Inertia, Principle Axis, Gyroscopic Motion, Gyroscopic Torque, Gyrostabilizer, Gyrocompass. Application to Ships and Aero planes. Stability of Two & Four Wheelers.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Understand the concept of mechanisms and their applications
- Analyze the motion aspects of mechanisms.
- Understand the Gears and their uses.

- Learn basic fundamentals associated with Gyroscopic effect.

BOOKS RECOMMENDED:

1. Thomas,B., Theory of Machines, CBS Publications & Distributions,2000
2. Shigley, J.,Theory of Machines and mechanisms, Oxford University,2006.
3. Ambekar, A.G.,Mechanism and Machine Theory, Jain Brothers,2005
4. Singh Sadhu, Theory of Machines, Pearson's Education ,2006.
5. Rattan,S.S.,Theory of Machines, Tata McGraw Hill Education (P) Ltd.,2011

LIST OF PRACTICAL ASSIGNMENT

1. Study of cam and follower and finding velocity and acceleration of follower.
 2. Study of slider crank mechanism.
 3. Study of different kinematic pairs.
 4. Generation of involute teeth profile for different gears.
 5. Performance of interference and undercutting of tooth (by plotting).
 6. Study of gyroscopic effect using gyroscope .
 7. Reducing and enlarging drawings using pantograph ,study of straight line mechanisms.
 8. Study of Double Hooks joint.
 9. Study of Oldham's coupling .
 10. Verification of Grashof's law.
 11. Study of automobile steering gears.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
MER4C3	L	T	P	L	T	P	Total
Machine Design & Drawing	3	1	2	3	1	1	5
Duration of Theory Paper: 4 Hrs							

Learning Objectives:

- To develop in students, machine drawing skills for communication of design concepts, ideas and design of engineering products
- To expose them to existing national standards related to drawings of machine parts.
- To introduce the concept of design procedure of simple machine elements.

Prerequisite(s): Engineering Drawing.

COURSE CONTENTS

UNIT-I

Design Practice Introduction: Introduction, Classification, General Considerations and Procedure of Machine Design, Design Stress, Factor of Safety, Stress and Deflection Analysis, Engineering Materials and Applications, Design of Pins / Keys, Cotter and Knuckle.

UNIT-II

Design of Permanent Joint: Design of Riveted Joints for Boiler, Structures and Eccentric Loading. Design of Welded Joints for Direct and Eccentric loading.

UNIT-III

Design of Temporary Joints: Design of Screw Fasteners for Direct and Eccentric loading. Design of Shafts and Couplings.

UNIT-IV

Machine Drawing Concepts and Practices: Introduction, Classification of Machine Drawings - Assembly Drawing, Part Drawing, Detailed Drawing, Catalogues Drawing, Drawing for Instruction Manuals, Schematic Representation, Patent Drawing. Principles of Drawings, Sectioning, Dimensioning, Limits, Fits and Tolerance, Symbols and Conventional Representation. Assembly Drawings – Introduction, Types of Assembly, Importance of BOM, Assembly procedures, Assembly of Engine Parts.

UNIT-V

Assembly Drawing Concepts and Practices and Introduction to CAD: Assembly of Machine Tools Parts, Assembly of Boiler Mountings. Production Drawings - Definitions, Difference with Normal Drawings, Method of amendment of Corrections. Reproduction of Drawing - Blue printing, Ammonia Printing, Xeroxing, Printing, Plotting. Introduction of Computer Aided Drafting - Computer Aided Drafting and Design, Advantages of Computer Aided Drafting and Design, CAD Software.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Perform free hand sketching of machine parts with standard of machine drawing.
- Select engineering materials based on their mechanical properties.
- Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints.
- Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints and couplings using CAD/CAM software.

Books Recommended:

1. V B Bhandari, *Design of Machine Elements*, 3/e, McGraw Hill Education, 2015.
2. N D Bhatt and V M Panchal, *Machine Drawing*, Charotar Publishing House, 2015.
3. K. Mahadevan, K. Balaveera Reddy, *Design Data Hand Book*, CBS Publishers & Distributors, New Delhi, 2015.
4. V B Bhandari, *Design Data Hand Book*, McGraw Hill Education, 2015.
5. PSG, *Design Data: Data Book of Engineers* by PSG college –Kalaikathir Achchagan- Coimbatore.
6. P S Gill, *A Text Book of Machine Drawing*, S K Kataria & Sons, 2015.
7. P C Gope, *Machine Design: Fundamentals and Applications*, 1/e PHI, 2015.
8. R L Norton, *Machine Design: An Integrated Approach*, Pearson Education, 2015.

LIST OF PRACTICAL ASSIGNMENT

- Draw the Symbols and Conventional Representation and Sections of Simple Machine Elements.
 - Design and Conventional Drawing / Computer Aided Drawing of Cotter Joint and Knuckle Joint.
 - Design and Conventional Drawing / Computer Aided Drawing of Couplings.
 - Design and Conventional Drawing / Computer Aided Drawing of Riveted Joints.
 - Design and Conventional Drawing / Computer Aided Drawing of Welded Joints.
 - Design and Conventional Drawing / Computer Aided Drawing of Screw Fasteners.
 - Conventional Drawing / Computer Aided Drawing of Engine Parts.
 - Conventional Drawing / Computer Aided Drawing of Machine Tool Parts.
 - Conventional Drawing / Computer Aided Drawing of Boiler Mountings.
 - Design / Analyse a mechanical structure which may involve different components included in syllabus. Prepare assembly and production drawings
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4C4	L	T	P	L	T	P	Total
FLUID MECHANICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make a fundamentally strong base to design fluid systems
- Understand the different fluid properties
- To develop skill to analyze fluid-flow patterns
- To become conversant with 'Fluid Dynamics, Fluid Kinematics in External and internal flows, Compressible flows.

Pre requisite(s) : Applied Mathematics I/II/III/IV, Applied Mechanics, Strength of Materials, Engineering Thermodynamics, Engineering Physics

COURSE CONTENTS

UNIT-I

Review of Fluid Mechanics: Introduction, Fluid Properties, Pressure and its measurement, Hydrostatic forces on submerged surfaces, Buoyancy and Stability. Relative Equilibrium.

Fluid Kinematics: Lagrangian and Eulerian Approaches, Fundamentals of Flow visualization, Potential flow, Stream function and Velocity Potential function, Vorticity, Rotationality and Circulation, Flow Nets, Reynold's Transport Theorem.

UNIT-II

Fluid Dynamics: Introduction, Conservation of mass, Mechanical energy and efficiency, Bernoulli's equation, Applications of Bernoulli's equation, Correction factors, Newton's Law and Conservation of momentum, Linear Momentum equation, Angular Momentum equation. Introduction to boundary layer, Laminar and Turbulent boundary layers, Boundary Layer Thickness, Reynold's, Number, Boundary Layer Separation.

UNIT-III

Flow over Bodies: Introduction, Navier-Stokes Equations, Drag and Lift, Friction and Pressure Drag, Drag Coefficients of common geometries, Parallel Flow over Flat Plates, Flow over Cylinders and Spheres, Aerofoils, Lift, Von-Karmon Vortex Street, Kutta-Joukowski Equation.

UNIT-IV

Flow Trough Conduits: Flow through Pipes: Introduction to Laminar and Turbulent Flows, Entrance region, Fully Developed flow, Laminar Flow in pipes, Turbulent flow in pipes, Losses in Pipe flow, Hagen-Poiseuille's Equation, Darcy's Weisbach Equation, Moody's Chart, Piping Networks.

Open Channel flow: Classification, Froude' Number and Wave Speed, Specific energy, Continuity and Energy equations, Uniform flow and Gradually Varied flow.

UNIT-V

Compressible Flow: Stagnation Properties, Speed of Sound and Mach Number, One-Dimensional Isentropic Flow, Isentropic Flow Through Nozzles, Shock Waves and Expansion Waves, Rayleigh and Fanno Flows. Introduction to Computational Fluid Dynamics (CFD) System.

Learning Outcomes:

Upon Completing the Course, Student will able to

- Well established concepts of the theory of fluid mechanicsDevelop bases of analyses in fluid mechanics
- Understand the fundamental mechanics involved in different fluid flow cases in applications
- Develop a base for Computational Fluid Dynamics (CFD)

BOOKS RECOMMENDED:

1. Douglas John F., *Fluid Mechanics*, Pearson Education, 2005.
2. Centgel Y. A., *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill Co, 2003.
3. Streeter V. L and Wylie E. B., *Fluid Mechanics*, McGraw-Hill Co, 2003.
4. White F., *Fundamentals of Fluid Mechanics*, McGraw-Hill Co, 2003.
5. Fox R.W., McDonald A T., Pritchard P. J., Mitchell J. W., *Fluid Mechanics*, 9ed 2015

LIST OF PRACTICAL ASSIGNMENT

1. To verify Bernoulli's Theorem.
 2. Calibration of Venturimeter and Orifice-meter.
 3. To find the Friction Coefficient of different pipes.
 4. Determination of different coefficients of the orifice
 5. Calibration of external cylindrical mouth pieces of different diameters/ Different L/D ratios
 6. Calibration of internal cylindrical or Borda's mouth piece.
 7. To Visualize the Forced/ Free Vortex Phenomenon.
 8. To determine loss of head in the fittings at various water flow rates.
 9. To Plot velocity potential and stream functions.
 10. To find the metacentric height of prismatic body.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4G2	L	T	P	L	T	P	Total
MECHATRONICS	3	1	0	3	1	0	4
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To provide an understanding of the mechatronic systems and their design process.
- To learn about the response and behavior of the devices that go into a mechatronic product, their interactions and overall behavior of the mechatronic system.
- To learn about the variety of sensors/transducers used in mechatronic applications and the processes used for the conditioning of signals.
- To learn about the methods used for the actuation and control of mechatronic systems.

Pre requisites: Basic course in electrical and electronic devices along with the concepts of digital electronics and a basic course in computer science and engineering.

COURSE CONTENTS

UNIT-I

Introduction to Mechatronic: Introduction to the field of mechatronic, Elements of a mechatronic system, Mechatronic design process, Applications in mechatronic. Introduction to signals & system: Block diagram approach to system modeling, Modeling of electrical, mechanical, translational and rotational, fluid and thermal systems, Measurement of system response, Linearization of non linear systems, Fourier series representation of signals, O/P response of first order and second order systems.

UNIT-II

Sensors & Transducers: Introduction of sensors and transducers, Performance characteristics of sensors and measurement systems, Sensors for motion & position measurement, Force torque & tactile sensors, Flow sensors, Temperature measuring devices, Ultra sonic sensors, Range sensors, Magnetostrictive transducers, Semiconductor, Fiber optic & Microelectromechanical system (MEMS) devices in mechatronic.

UNIT-III

Signal conditioning & recording of data: Basic steps of signal conditioning, Devices for signal conditioning & data conversion : Voltage divider & rectifiers , bridge circuits, Operational and instrumentation amplifiers, filters, comparators & oscillators multiplexers, timers, amplitude modulation & demodulation, voltage to frequency & frequency to voltage converters, pulse width modulation. Analog to digital conversion & digital to analog conversion.

UNIT-IV

Actuators: Introduction, Mechanical actuation systems, Electrical actuation systems: solenoids &

relays, electric motors: DC motors, AC motors, Stepper motors, Servo motor drive circuits, selection of a motor, Fluid power actuators: Hydraulic and Pneumatic actuation systems, piezoelectric actuators.

UNIT-V

Interfacing & control of mechatronic systems: Elements of a data acquisition & control system, Microprocessor and Microcontroller based systems, Overview of input / output systems: Interfacing, I/O addressing, Interface requirements, Peripheral interface adapters, Serial common interface, Input /Output card & software, open systems, Communication interfaces, Voltage regulators and power supplies, Introduction of various control systems, Control modes and control system performance.

Learning Outcomes:

Upon completing the course, student will able to:

- Acquire the basic knowledge for the application of the core technologies in the areas of mechanics, electronics and information processing to the solution of problems.
- Recognize the need for models of the systems in order to predict their behavior.
- Select and integrate the appropriate devices for the pickup, conditioning and display of signals related to the various processes involved in a mechatronic system..
- Select the suitable actuation and control system for a mechatronic application.

BOOKS RECOMMENDED

1. W.Bolton, *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering*, 4th Ed, Pearson Education.
2. Nitai Gour & P.Mahalik, *Mechatronics: Principles, concepts and applications*, Tata McGraw-Hill Publishing Company Ltd.
3. Alciatore David G. & Hestand Michael B., *Introduction to mechatronics and measurement systems*, 4th Ed McGraw-Hill Publication.
4. Carryer J.Edward, Ohline R.Matthew, Kenny Thomas W., *Introduction to Mechatronic Design*, Pearson Education, Indian Edition 2013.
5. Ramachandran K.P., Vijayaraghavan G.K., Balasundaram M.S., *Mechatronics Integrated Mechanical Electronic Systems*, Wiley India Pvt.Ltd.
6. Narka and Choudhary, *Instrumentation, Measurement and analysis* Tata Mc Graw Hill Publishing Company Ltd.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER4L2	L	T	P	L	T	P	Total
Workshop/Practical (MECHATRONICS)	-	-	2	0	0	1	1
Duration of Theory Paper: 0 Hrs.							

Learning Objectives:

1. To learn about the construction and working of a variety of sensors/transducers used in mechatronic applications.
2. To learn about the actuation and control of mechatronic systems using hydraulic and pneumatic methods.
3. To learn about the construction and working of mechatronic systems used in a day-to-day lives.

Pre requisite(s): Basic course in electrical and electronic devices along with the concepts of digital electronics.

Learning Outcomes:

Upon completing the course, student will able to:

- Acquire the basic understanding of the characteristics of various sensors and transducers used in mechatronic and measurement systems.
- Select the suitable devices and arrange them in the circuit for the control of actuators using hydraulic and pneumatic means.
- Acquire the basic understanding of common mechatronic systems.

LIST OF PRACTICAL ASSIGNMENT

- Study of electrical resistance strain gauges.
- Study of linear variable differential transformer (LVDT).
- Study of capacitive transducer.
- Study of piezoelectric transducer.
- A mechatronic approach to the study of the following: Printers, Photocopier machine, Ignition system in automobiles, TV remote control, Washing Machine etc.
- Calibration of pressure gauge using dead weight pressure gauge tester.
- Calibration of orifice plate using anemometer.
- Study and Calibration of Thermocouple.
- Study on Hydraulic system power pack.
- Study on Pneumatic system power pack.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SMR4S4	L	T	P	L	T	P	Total
ENGINEERING ECONOMICS	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To make fundamentally strong base for decision making skills by applying the concepts of economics.
2. Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
3. Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

COURSE CONTENTS

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income - Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

- Upon completing the course, students will be able to:
- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.

- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.
- Solve economical problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

Books Recommended:

1. C S Park, Contemporary Engineering Economics, Pearson Education, 2002.
2. J S Chandan, Statistics for Business and Economics, Vikas Publishing.
3. H. L. Ahuja, Principles of Microeconomics, S. Chand (G/L) & Company Ltd, 2002.
4. D. N. Dwivedi, Macroeconomics Theory and Policy, Tata McGraw-Hill Publishing Company, 2010.
5. S Damodaran, Managerial Economics, Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course, students need to do assignment:

Students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references.

COMPUTER ENGINEERING DEPARTMENT
SCHEME&SYLLABUS
IIInd YEAR

Semester-IV

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	CER4C1	Discrete Structures	PC	3-1-0	4
2.	CER4C2	Operating Systems	PC	3-1-1	4+1(P)
3.	CER4C3	Abstraction & Paradigms for Programming	PC	3-1-1	4+1(P)
4.	CER4C4	Data Base Management Systems	PC	3-1-1	4+1(P)
5.	CER4G2	Digital Signal Processing	GE	3-1-0	4
6.	CER4L2	Hands-on Android Programming	--	0-0-1	1
7.	SCR4S4	Engineering Economics	--	2-0-0	2
8.	CER4V4	Comprehensive Viva - IV	Virtual	0-0-4	4
Total Credits					30

Devi Ahilya University, Indore, India				II Year B.E. (Computer Engg.)			
Institute of Engineering & Technology				(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C1 DISCRETE STRUCTURES	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science.
- Provide the fundamentals of formal techniques for solving the problems in mathematical Reasoning, combinatorial analysis, discrete structures, algorithmic thinking, and applications and modeling.

Course Contents

Unit-I

Sets: Algebra of sets, laws of sets, computer representation, cardinality of a set, principle of inclusion-exclusion.

Functions: Characteristic function of a set, floor and ceiling functions, mod function, hashing function.

Relations: Binary Relation, properties, closure of a relation, equivalence and partial order relations, partially ordered set, Hasse Diagram, totally ordered set, maximal and minimal elements, upper bound, lower bound, greatest lower bound and least upper bound, lattice, sub lattice, properties of lattices, distributive lattices, complemented lattices, modular lattices, topological sorting.

Unit-II

Propositional Logic: Proposition, logical connectives, bit operations, conditional and bi-conditional propositions, logical equivalence, algebra of propositions, tautology, contradiction and contingency, normal forms, logic in proof, predicates and quantifiers, rules of inferences, Applications of propositional logic to logic puzzles, Boolean searches, logic circuits and system specifications.

Mathematical Induction: Strong induction, well-ordering, Recursive definitions.

Advanced Counting techniques: Pigeon-hole principle, sequences and summations, generating functions.

Recurrence relations:-Formation, methods of solution and application.

Unit-IV

Graph Theory: Terminology, graph representation-incidence and adjacency matrices, walk, path, cycle, graph isomorphism, connectedness, Euler & Hamiltonian graphs, planar graph, graph coloring, shortest paths algorithms.

Trees: Terminology, spanning trees, minimum spanning trees, tree traversals; prefix codes.

Unit-V:

Binary operation, groupoid, semi group, monoid, group, subgroup, cyclic group, permutation group, definition and examples of Rings, Integral domain and Fields; Application to coding theory.

Boolean Algebra-Definition, laws of Boolean algebra, Boolean functions, sum of products and product of sum form, normal form, simplification of Boolean function by algebraic method, Boolean expression for logic and switching network, Karnaugh Map Method for simplification of Boolean expressions.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn a particular set of mathematical facts and know how to apply them.
- Think logically and mathematically.
- Use and analyze recursive definitions.
- How to count some different types of discrete structures.
- Techniques for constructing mathematical proofs and to reason about the efficiency of an algorithm.

Books Recommended:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Edition 2007.
2. Kolman, Busby & Ross, Discrete Mathematical Structures, 6th edition, Pearson Education, 2008.
3. C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
4. Trembley and Manohar, Discrete Mathematical structures for Computer Science, McGraw Hill, 1986.
5. Edgar G. Goodaire, Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd edition Prentice Hall, 2005

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C2 Operating Systems	L 3	T 1	P 2	L 3	T 1	P 1	Total 4+1(P)
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide an introduction to Operating System concepts and its design issues.

Pre-requisites: Computer Organization.

COURSE CONTENTS

UNIT- I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT- II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT- III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance

UNIT- IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT- V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

- To learn operating System concepts and its design issues.

BOOKS RECOMMENDED:

1. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
2. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
3. Tanenbaum, Modern Operating Systems, PHI.
4. W. Stalling, Operating Systems, Macmillan.
5. H. M. Dietel , Operating Systems, Addison Wesley Longman.
6. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
7. Sumitabha Das, Unix Concepts & Applications: includes SCO Unix & Linux, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C3	L	T	P	L	T	P	Total
Abstraction and Paradigms for Programming	3	1	1	3	1	1	4+1(P)
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop an understanding of different paradigms of programming languages.
- Students will gain both a conceptual understanding of specification and design issues in different paradigms of programming languages and their implementation

Prerequisites: Discrete Structures, Programming Fundamentals.

COURSE CONTENTS

UNIT I

Study of Programming Languages- History of Programming Languages, Features of good Language; Language Design Issues, Static and Dynamic type Checking, Type Checkin Dynamic Type Checking Static Type Checking, Strong Typing, Type of Bindings, Language Paradigms:- Imperative, Object Oriented, Functional Programming, Logic Programming, Parallel Programming, Concurrent Programming .Introduction to Open Source Software.

UNIT II

Programming with Python:-Basic Syntax, Variable Types, Basic Operators, Decision Making, Loops, Numbers, Strings, Lists, Tuples, Dictionary, Functions, Modules, Class/Object, Regular Expression, Database Access, Multithreading, Web programming with Python, Web Scraping, File I/O, Package Management Tools, Python Exercises

Unit III

Imperative Programming with Advanced C++: - Types and Declarations, Pointers, Arrays, Structures, Unions, Enumerations, Statements, Expressions, Functions. Abstraction Mechanisms: Classes, Special Operators, Hierarchies, Templates, Generic Programming
Standard Template Library in C++: -
Containers: Abilities, Operations, Types. Examples: Vector, Lists, Maps and Multimaps, Unordered containers .
Algorithms: Non-Modifying, Modifying Iterators: Input, Output, Forward, Bidirectional, Random Access. Programming Exercises.

UNIT IV

JavaScript : Overview, Syntax, Placement, Variables, Operators, Data Types Control Structures, String ,Number, Regular Expressions ,Math ,Arrays, Array Methods, Array Sort, Events, Cookies, Page Redirect, Dialog Box, Void Keyword , Page Printing, Objects, Forms, Functions, Error handling, Validation, Animation, Basics of MVC Architecture
JavaScript Frameworks : JQuery, Introduction to Node.js and Angular.js

Unit V:-

XML : Basics, Namespaces , Schema, XSLT, XPATH, Document Object Model, Simple API for XML

Learning Outcomes:

- Students will able to apply different paradigms of programming languages in real world problems.

BOOKS REOMMENDED:

1. T. W. Pratt, M. V. Zelkowitz, Programming Languages: Design and Implementation, 4/e, Pearson Education, 2000.
2. D. P. Friedman, M Wand, Essentials of Programming Languages, 3/e, MIT Press, 2008.
3. R. W. Sebesta, Concepts of Programming Languages, 8/e, Addison Wesley, 2008
4. David Hunter “Beginning XML”, Wiley Dreamtech, Fourth Edition,2007.
5. Kal Ahmed, Sudhir Ancha “Professional Java XML”,SPD 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C4 DATABASE MANAGEMENT SYSTEMS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the need of databases, its architecture and schemas.
- To familiarize students with representing domains using entity-relationship modelling.
- How to design a normalized schema in the relational data model.
- Develop skills in students to implement schema and query using SQL.
- Develop ability to develop database applications based on the requirements.

Prerequisites: Knowledge of Data Structures and Computer Programming and some topics of operating systems.

COURSE CONTENTS

Unit-I

Introduction: Database Environment: Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit-II

Database Analysis & Modeling: Introduction to Data Analysis and Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs- Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues.

Unit-III

Database Design: Introduction to Logical Database Design, Relational Data Model – Codd's Rules, Relational Algebra etc.; Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc..

Unit-IV

System Implementation & Transaction Processing: Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs - Views, Triggers, Cursors etc; Transaction Processing – Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking etc.

Unit-V

Advance Topics: File Organization and Indexes, Hashing Techniques, B-trees, B+ Trees etc; Database Recovery, Database Security, Introduction to Data Warehousing and Data Mining, Emerging Database Technologies and Applications etc., Overview of MySQL.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand the fundamentals of relational database system including: data models database architectures and database manipulations.
- Understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using DBMS such as MySQL.
- Be familiar with managing database systems.
- Understand new developments and trends in databases.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
3. A First Course in Database Systems, By J. Ullman, J. Widom, 3rd Edition, Pearson Education, 2014.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.
5. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
6. MySQL : The Complete Reference, 1st Edition, McGraw Hill Education, 2004.

List of Assignments:

During the learning of course, students need to do assignments:

1. Designing an E-R model.
2. Solving basic SQL assignments.
3. Solving intermediate SQL assignments involving Nested and Join queries.
4. Using PL/SQL constructs involving procedures, triggers, views etc.
5. Exploring how transaction processing is handled by MySQL.
6. Minor Project on developing a database application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4G2 DIGITAL SIGNAL PROCESSING	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the analysis techniques like for discrete time system analyse the discrete time systems in time and frequency domain using Z- transform, Fourier transform, Discrete Fourier transform to learn the signal processing.

Prerequisites: Awareness about the analysis of signals and systems

COURSE CONTENTS

Unit-I

Introduction to signal processing, discrete time signals and sequence operation, properties. Discrete time systems, their properties, linear time invariant systems, convolution, properties of LTIV systems, inverse system, linear constant coefficient difference equation and their solutions.\

Unit-II

Frequency Domain Representation of discrete time signals and systems, suddenly applied complex exponentials inputs, representation of sequences by Fourier transform, condition of their convergence, symmetry properties of FT, Fourier transform theorems.

Unit-III

Introduction to Z transforms, ROC and their properties, Inverse Z transform, Z transform properties, initial value theorem, structure for discrete time systems, and block diagram representation of linear constant coefficient difference equations. Signal flow graph representation of LCCDE, basic structure for IIR system, direct forms, cascade, parallel forms, transposed forms.

Unit-IV

Representation of periodic sequences, discrete Fourier series, properties of DFS, Fourier transform of periodic signals, sampling the FT, Fourier representation of finite duration sequences, the discrete Fourier transform, Circular convolution, linear convolution using DFT, implementing LTIV system using DFT.

Unit-V

Basic structure for FIR systems, direct form, cascade form structures. Efficient Computation of DFT, Goertzel algorithm, decimation in time FFT algorithm, In place Computation, alternative forms, decimation in frequency FFT algorithm, algorithm for N composite number, prime factor algorithm.

Learning Outcomes:

On Completion of this course the students will be able to:

- The focus of this course is to familiarize the students with the concept of Fourier transform & Fourier series.
- Analyze the spectral characteristics of signals using Fourier analysis.
- Classify systems based on their properties and determine the response of LTI
- Identify system properties based on impulse response and Fourier analysis.

- Apply transform techniques to analyze continuous-time and discrete-time

Books Recommended:

1. Oppenheim and Schaffer, discrete time signal processing, 2/E PHI, 2005.
2. Proakis and Manolakis, discrete time processing, PHI, 2005.
3. S.Mitra, discrete time processing, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4L2 Hands-on Android Programming	L	T	P	L	T	P	Total
	0	0	2	0	0	1	1

Learning Objectives:

- To familiarize students with Android operating systems internals.
- To learn and develop skills for developing an Android application.

Prerequisites: Knowledge of Java programming and Operating Systems basics.

COURSE CONTENTS

Unit – I

Introduction – What is Android, Installing softwares, Hello Android examples, software stack, android core building blocks, Emulator.

Unit – II

Android UI – Working with buttons & other components, Activity lifecycle, Intent – implicit and explicit, Fragment lifecycle, Android Menu, Layout manager, Adaptor and view.

Unit – III

Android Service & Data Storage – Introduction, Android service API, Android service life cycle, Shared preferences, internal storage, external storage, SQLite, XML & JSON.

Unit – IV

Android Content Provider & Notification – Contact content provider, Other built-in content providers, Understanding content URI, ContentResolver, Notification API, Setting notification properties, issuing notification.

Unit – V

Android APIs & Connectivity – Overview of TextToSpeech API, Telephony API, Location API and Sensor API, Working with WiFi and Bluetooth.

Learning Outcomes :

- By the end of the course, student will be able to write simple GUI applications, use built-in widgets and components, work with the database to store data locally, and much more.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SCR4S4 ENGINEERING ECONOMICS	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

Course Contents:

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency. Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale. Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income - Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.

- Solve economical problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

Books Recommended:

1. C S Park, Contemporary Engineering Economics, Pearson Education, 2002.
2. J S Chandan, Statistics for Business and Economics, Vikas Publishing.
3. H. L. Ahuja, Principles of Microeconomics, S. Chand (G/L) & Company Ltd, 2002.
4. D. N. Dwivedi, Macroeconomics Theory and Policy, Tata McGraw-Hill Publishing Company, 2010.
5. S Damodaran, Managerial Economics, Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course, students need to do assignment:

- Students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references.

**ELECTRONICS AND INSTRUMENTATION ENGG.
SCHEME&SYLLABUS
IInd YEAR**

Semester-IV

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	EIR4C1	COMPUTER ORGANIZATION AND ARCHITECTURE	PC	3-1-0	4
2	EIR4C2	ELCTRICAL AND ELECTRONIC MEASUREMENT	PC	3-1-1	4+1(P)
3	EIR4C3	ANALOG ELECTRONICS	PC	3-1-1	4+1(P)
4	EIR4C4	SENSOR & TRANSDUCER	PC	3-1-1	4+1(P)
5	EIR4G2	SIGNALS AND SYSTEMS	GE	3-1-0	4
6	EIR4L2	ELECTRONIC WORKSHOP-II		0-0-1	1(P)
7	SIR4S4	ENGG. ECONOMICS		2-0-0	2
8	EIR4V4	COMREHENSIVE VIVA - IV	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4C1	L	T	P	L	T	P	Total
COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the structure, function and characteristics of computer systems.
- To identify the elements of modern instructions sets and their impact on processor design
- To explain the function of each element of a memory hierarchy.
- To identify and compare different methods for computer I/O.

Prerequisite(s): Knowledge of logic circuits - combinational and sequential

COURSE CONTENTS

Unit I: Computer Organization

Computer types, Structure with basic computer components, Function in brief with instruction fetch and execute, Interrupts and I/O communication, Interconnection structure, bus interconnection, Multiple Bus hierarchies, Elements of bus design Performance metrics and measurement

Unit II: Computer Memory System

Characteristics of memory system, Memory hierarchy, Cache Memory- Cache memory principles, Elements of cache design- cache address, size, mapping functions, replacement algorithms, write policy, Internal Memory- semiconductor memory, External Memory- Hard Disk organization, RAID

Unit III: Input and Output System

I/O modules- Module function and I/O module structure, Programmed I/O , Polling I/O, Interrupt driven I/O , DMA function, Synchronous and Asynchronous serial data communication, Computer peripherals like keyboard, mouse, printer, scanner and display devices

Unit IV: Processor Organization

Evolution of Intel processor architecture- 4 bit to 64 bit, Control unit Hardwired and micro programmed, concept of pipelining , Study of microprocessor 8085, Functional pins and Register organization, Memory mapped I/O and I/O mapped I/O schemes,

Unit V: Instruction Set and Assembly Language Programming

Addressing modes and Formats- immediate, direct, indirect, register, register indirect, displacement and stack, Instruction Cycle machine cycle and Data flow, 8085 instruction set and

assembly programming, Time delay concept , stack and subroutines, Interrupt handling, Instruction set architecture RISC and CISC

Learning Outcomes:

On completion of the course, student will be able to :

- Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
- Analyze the performance of commercially available computers.
- To develop logic for assembly language programming

BOOKS RECOMMENDED

1. William Stallings, “*Computer Organization and Architecture*”, Prentice Hall of India, Sixth Edition.
2. A. Tannenbaum, “*Structured Computer Organization*”, Pearson Education, 2002.
3. Patterson & Hennessy, “*Computer Organization and Design*”, Morgan Kaufmann, 2007
4. Ramesh S. Gaonkar, “*Microprocessor, Architecture, Programming, and Applications with the 8085*”, Penram International Publication, 5/e

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4C2	L	T	P	L	T	P	Total
ELECTRICAL AND ELECTRONIC MEASUREMENT	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce students to monitor, analyze and control any physical system.
- To understand students how different types of meters work and their construction.
- To provide a student a knowledge to design and create novel products and solutions for real life problems.
- To introduce students a knowledge to use modern tools necessary for electrical projects.

Prerequisites(s): Basic Electrical Engg and Basic Electronics

COURSE CONTENTS

UNIT-I

Basic concept of Measurements and Instruments, Measurement Methods, Generalized measurement System, Classification of Instruments, Static & Dynamic Characteristics, Errors & Uncertainty measurement of system, Linear & Non-linear Systems.

UNIT-II

Operation principles of Analog Instruments - Moving coil, Moving iron, PMMC, Dynamometer and

Induction type instruments, Measurement of Voltage, Current, Power, Power Factor, Energy, Instrument Transformer - current and potential transformer, Measurement of Phase & Frequency.

UNIT-III

Measurement of Resistance- low, medium and high resistance measurement, A.C. Bridges-general equation, Potentiometer- DC potentiometer, Multi-range potentiometer, AC potentiometer and their applications, High Frequency Measurement , Twin T & Bridge Networks, Q-meter and its applications.

UNIT-IV

Display Devices I- Construction & working of Basic CRO, its Components (Deflection plates, Screen, Aquadag, Time Base Generator, Oscilloscope Amplifiers), Measurements of phase and frequency (Lissajous Patterns), Types of CRO, Special types of CRO, Types of CRO Probes.

UNIT-V

Display Devices II- Digital Voltmeter (ramp type DVM, Integrating and Potentiometric type DVMs, Signal Generator, Function Generator, Wave Analyzer, Distortion Analyzer, Spectrum Analyzer, Frequency Counter, Display Devices & Recorders.

Learning Outcomes: Upon Completing the Course, Student will able to:

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy.
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.
- Ability to use Digital voltmeters

BOOKS RECOMMENDED:

1. A.K.Sawhney & Puneet Sawhney, “A Course in Electrical And Electronic measurements and Instrumentation”, 7/e, Dhanpat Rai & Co.(P) Ltd.,2005
3. Albert D.Helfrick & William D.Cooper, “Modern Electronic Instrumentation and measurement Technique”,Low Price Edition, Pearson Education, 2005
5. Ernest O.Doebelin, “Measurement Systems Application and Design”, 5/e, Tata McGraw –Hill Publishing Company Ltd., 2004
6. H.S.Kalsi, “Electronic Instrumentaion”, Technical Education Series, Tata McGraw – Hill Publishing Company Ltd.,2001
7. Alan S.Morris, “The Essence of Measurement”, Eastern Economic Edition, Prentice Hall of India Private Limited.,1997

List of Practical Assignments:

1. To calibrate test Ammeter with reference Ammeter and hence detection of deviation of the test ammeter from reference ammeter using comparison method.
2. To calibrate test Voltmeter with reference Voltmeter and hence detection of deviation of the test Voltmeter from reference Voltmeter using comparison
3. To calibrate test Wattmeter with reference Wattmeter and hence detection of deviation of the test Wattmeter from reference Wattmeter using comparison method.
4. To calibrate test Energy meter with reference Energy meter and hence detection of deviation of the test Energy meter from reference Energy meter using comparison method.
5. To study Hay’s Bridge and hence determination of unknown value of Self Inductance of given coil using Hay’s Bridge.

6. To study Anderson Bridge and hence determination of unknown value of Self Inductance of given coil using Anderson Bridge.
7. To study Schering's Bridge and hence determination of unknown value of Capacitance of given coil using Schering's Bridge.
8. To study Maxwell's Bridge and hence determination of unknown value of Inductance of given coil using Maxwell's Bridge.
9. To study Wien's Bridge and hence determination of unknown value of Capacitance of given coil using Wien's Bridge.
10. To study De Sauty Bridge and hence determination of unknown value of Capacitance of given coil using De Sauty Bridge.
11. To study Kelvin's Bridge and hence determination of unknown value of very low resistance of given coil using Kelvin's Bridge.
12. To study the construction detail of CRO including measurement of voltage, Phase and frequency with the help of CRO.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4C3	L	T	P	L	T	P	Total
ANALOG ELECTRONICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To recall various BJT parameters, connections and configurations.
- To Explain and Demonstrate BJT Amplifier, Hybrid Equivalent and Hybrid Models.
- To explain construction and characteristics of JFETs and MOSFETs.
- To explain various types of FET biasing, and demonstrate the use of FET amplifiers.
- To Demonstrate and Construct Frequency response of BJT and FET amplifiers at various frequencies.
- To Define, Demonstrate and Analyze Power amplifier circuits in different modes of operation.
- To Demonstrate and Apply Feedback and Oscillator circuits using FET.

Prerequisites: Basic knowledge and understanding of semiconductor devices and operation required.

COURSE CONTENTS

Unit I

BJT AC Analysis: BJT AC Analysis:

BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias,

Emitter follower configuration. Darlington connection-DC bias; The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit Fixed bias, Voltage divider, Emitter follower configuration;

Complete Hybrid equivalent model, Hybrid π Model.

Unit II

Field Effect Transistors: Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET. **FET Amplifiers:**

JFET small signal model, Fixed bias configuration, Self-bias configuration, Voltage divider configuration, Common Gate configuration. Source-Follower Configuration, Cascade configuration.

Unit III

BJT and JFET Frequency Response:

Logarithms, Decibels, Low frequency response – BJT Amplifier with RL, Low frequency response FET Amplifier, Miller effect capacitance, High frequency response – BJT Amplifier, High frequency response-FET Amplifier, Multistage Frequency Effects.

Unit IV

Feedback and Oscillator Circuits:

Feedback concept, Feedback connection types, Voltage Series, Voltage Shunt, Current Series, Current Shunt, practical feedback circuit Phase shift oscillator, Wien bridge oscillator, Colpitts Oscillator, Hartley oscillator, Crystal Oscillator.

Unit V

Power Amplifiers:

Definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation and circuits, Amplifier distortion, Class C and Class D amplifiers. Voltage regulators: Discrete transistor voltage regulation - Series and Shunt Voltage regulators.

Learning Outcomes: After studying this course, students will be able to:

- Acquire knowledge of and Working principles, characteristics and basic applications of BJT and FET.
- Single stage, cascaded and feedback amplifier configurations and Frequency response characteristics of BJT and FET.
- Analyze the performance of FET amplifier in CS configuration and Power Amplifiers and Oscillator circuits.
- Interpretation of performance characteristics of transistors amplifiers, frequency Response and Oscillators.
- Apply the knowledge gained in the design of transistorized circuits, amplifiers and Oscillators.

BOOKS RECOMMENDED

1. Adel S. Sedra and Kenneth C. Smith, “*Micro Electronic Circuits Theory And Application,*” 5th Edition ISBN:0198062257
2. Behzad Razavi, “*Fundamentals of Microelectronics*”, John Wiley ISBN 2013 978-81- 265-2307-8
3. J.Millman & C.C.Halkias, ”*Integrated Electronics*”, 2nd edition, 2010, TMH. ISBN 0- 07-462245-5
4. K. A. Navas, “*Electronics Lab Manual*”, Volume I, PHI, 5th Edition, 2015,
5. ISBN:9788120351424.

List of Practical Assignments:

1. Realize BJT Darlington Emitter follower with and without bootstrapping and determine the gain, input and output impedances.
2. Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain bandwidth product from its frequency response.
3. Plot the transfer and drain characteristics of a JFET and calculate its drain resistance, mutual conductance and amplification factor.

4. Design, setup and plot the frequency response of Common Source JFET/MOSFET amplifier and obtain the bandwidth.
5. Plot the transfer and drain characteristics of n-channel MOSFET and calculate its parameters, namely; drain resistance, mutual conductance and amplification factor.
6. Set-up and study the working of complementary symmetry class B push pull power amplifier and calculate the efficiency.
7. Design and set-up the RC-Phase Shift Oscillator using FET, and calculate the frequency of output waveform.
8. Design and set-up the following tuned oscillator circuits using BJT, and determine the frequency of oscillation. (a) Hartley Oscillator (b) Colpitts Oscillator
9. Design and set-up the crystal oscillator and determine the frequency of oscillation

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4C4	L	T	P	L	T	P	Total
SENSOR AND TRANSDUCERS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop good understanding on the principle of operation and the important characteristics of Sensor & Transducers commonly used in industry.
- Knowledge of recent developments in the field of Sensor & Transducers.
- Criterion for selection, installation of suitable sensing elements and to design the appropriate signal conditioning circuit for their specific measurement applications.

COURSE OF CONTENTS

Unit 1: Transducer Fundamentals

Basic concept of Sensors and transducer, their comparisons, Classification of Transducer, Working of transducers used for measurement of Displacement- resistive, inductive and capacitive method, Linear and Angular Velocity moving coil and moving magnet method, various tachometers and stroboscope, Acceleration- seismic and piezo electric accelerometer, Working principle of Capacitive Transducer, Piezo-Electric Transducer, and LVDT.

Unit 2: Strain and Temperature Measurement

Strain Gauges- strain measurement technique, resistance strain gauge and its types, Signal conditioning of strain gauges, Transducers for Temperature Measurement- non- electrical and electrical method, Bimetallic Thermometer, Resistance Thermometer like RTD, Thermistor and Thermocouple, Radiation and Optical Pyrometer.

Unit 3: Pressure Measurement

Transducers for Measurement of Pressure: - Manometers types (like Single column, inclined, U-tube), Mechanical Types (Bourdon, bellows and diaphragm), Elastic Types transducers, Low Pressure measurement gauges (Ionization, McLeod etc.).

Unit 4: Flow Measurement

Transducers for Measurement of Flow: - Types of flow meters, Theory of variable head constant area meter and its types, theory of constant head variable area meter and its types, theory of variable head variable area meter and its types, Special flow meters- Electromagnetic, Hot wire Anemometer, Turbine meter and Ultrasonic flow meter.

Unit 5: Miscellaneous Measurement and Smart Sensor

Transducer for Level Measurement:- direct and indirect method, resistive method, Ultrasonic, Capacitive and Gamma Ray level Gauges. Measurement of Humidity and Moisture- basic definitions, psychometric method,

Smart sensors - Fibre optic sensors, MEMS – Nano sensors, proximity sensor.

Learning Outcomes: After successful completion of this course, students should

- Understand the fundamental principles of various types of sensors including thermal, mechanical, electrical, electromechanical and optical sensors.
- Understand their general characteristics, terminologies, sensing and transduction principles;
- Be familiar with criteria for sensors and transducers selection and choose appropriate measurement methods for engineering tasks and scientific researches.

BOOKS RECOMMENDED:

1. A.K.Sawhney & Puneet Sawhney, A Course in Mechanical Measurements and Instrumentation, 12/e, , Dhanpat Rai & Co. (P) Ltd.,2004
2. B.C.Nakra & K.K.Chaudhary,Instrumentation Measurement And Analysis, Tata McGraw-Hill Publishing Company Ltd, New Delhi.,1996
3. D.Patranabis, Principles of Industrial Instrumentation, 2/e, Tata McGraw-Hill Publishing Company Ltd, Delhi.,1998
4. James W. Dally, William F. Riley & Kenneth G.McConnell, Instrumentation for Engineering Measurements,2/e,Wiley Student Edition, John Wiley & Sons,INC,2003.
5. John P.Bentley, Principles of Measurement Systems, Low Price Edition, Pearson Education Asia,2000
6. .Dr.D.S.Kumar, Mechanical Measurements and Control, 3/e, Reprint-2004, Metropolitan Book Co. Private Ltd.,2004
7. Liptak, B.G., “Instrumentation Engineers Handbook (Measurement)”, CRC Press, 2005.

List of Practical's:

- 1.Measurement of Temperature using Thermocouple.
- 2.Measurement of Temperature using Thermistor.
- 3.Measurement of Temperature using RTD.
- 4.To measure linear displacement using LVDT.
- 5.To study the principle and functioning of Load Cell (Cantilever type).
- 6.To study the principle and functioning of Load Cell (Strain gauge type).
- 7.To measure angular displacement using Capacitive Gauge.
- 8.To study the functioning of capacitive based digital water level indicator.
- 9.To study the conductivity meter
10. To measure pressure using Manometer.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4G2	L	T	P	L	T	P	Total
SIGNAL & SYSTEMS	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course aims to provide detailed description Signals and System Analysis. Fourier series and Fourier transform, Laplace and Z Transform along with respect to SISO systems and State variable analysis for MIMO systems.

Prerequisite(s): Engineering Mathematics

COURSE CONTENTS

UNIT-I Fundamentals of Signals & Systems:

All basic Continuous time signals. Energy signal and Power signal. Continuous time systems, Discrete time signals and Discrete time systems. Linear Time invariant system theory and its significance to continuous time and discrete time system analysis. Linear convolution Integral and Linear convolution sum.

UNIT-2 Fourier series and Fourier Transform:

Fourier series, Different forms of Fourier series, Dirchlet conditions, Wave symmetry, Parseval theorem. Fourier Transform; its properties and applications. Symmetry properties of Fourier transform. System analysis with Fourier transform. Ideal Filters.

UNIT-3 Laplace Transform and its applications:

Laplace Transform and its properties. Region of convergence, Laplace Transform of some common functions, Initial value and Final value theorem. Inverse Laplace Transform, Transfer function, Characteristics of transfer function, Poles and Zeros, System analysis using Laplace Transform.

UNIT-4 State Variable Techniques:

Introduction, State Variable Concept, Form of state equations, State space representation of continuous time and discrete time LTI systems, solution of state equation, state transition matrix.

UNIT -5 Discrete Time Signal/Systems and Z-Transform:

Introduction, Z-Transform definition, Region of Convergence, Z-Transform of some common sequences, properties of Z-Transform, Inverse Z-Transform, System function of discrete time, LTI Systems, Convolution Theorem, Complex Convolution Theorem.

Learning Outcomes:

On Completion of this course the students will be able to:

- The focus of this course is to familiarize the students with the concept of Fourier transform & Fourier series.
- Analyze the spectral characteristics of signals using Fourier analysis.
- Classify systems based on their properties and determine the response of LTI
- Identify system properties based on impulse response and Fourier analysis.
- Apply transform techniques to analyze continuous-time and discrete-time

BOOKS RECOMMENDED:

1. Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin, “*Signals and Systems*”, Pearson 4th Edition
2. Hwei P. Hsu (Schaum's Outline Series), “*Signals and Systems*”, TMH Edition
3. A. Anand Kumar, “*Signals and Systems*”, PHI 3rd Edition
4. A.V. Oppenheim et al, “*Signals and Systems*”, 2nd Edition, Pearson 2003
5. Smarajit Ghosh, “*Signals and Systems*”, Pearson
6. Simon Haykin , “*Signals and Systems*” 2nd edition, Wiley, 2008.
7. B P Lathi, “*Digital and Analog Communication Systems*” 4th edition, Oxford University Press, 2000.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4L2	L	T	P	L	T	P	Total
ELECTRONIC WORKSHOP II	0	0	1	0	0	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize students with various Electronic devices and their specifications.
- Develop skill for Design and Testing of different types of Electronic subsystems using Analog and Digital IC's.
- Familiarize students with PCB layout tool to prepare PCB print for assigned project
- Development skill of writing a structured technical document for project and its presentation
- Develop ability to diagnose faults and their rectification.

COURSE CONTENTS

List of Exercises / Experiments

1. Familiarization /Identification of electronic components with specification and Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.
2. Drawing of electronic circuit diagrams using EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.
3. Familiarization/Application of testing instruments and commonly used tools like Multimeter, Function generator, Power supply, CRO etc. Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.
4. Testing of electronic components Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter and different IC's using IC tester.
5. Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
6. Assembling electronic circuit/system on general purpose PCB, testing and show the functioning (Total two projects. **Any one from 1-13 and one from 14-18 project list**)

List of Projects

- Fastest Finger First Indicator Project
- Fire Alarm Circuit
- Plant Watering Watching Indicator
- Clap switch for operating electric equipment like fan, bulb
- Mobile Battery Charger
- 7 Segment Counter
- Metal Detector
- Electronic letter box

- Traffic Light circuit
- Light-Sensitive Fire Alarm
- Infrared Motion-Sensing Relay Switch
- LPG Leakage Detector
- Motion Detector Using NE555 Timer
- Design and implement a single stage voltage amplifier using BJT in common emitter configuration for a gain of 10 to amplify input voltage 10 mVp-p, 10-100 KHz. Also tabulate the results for different input range.
- Design and implement a two stage R-C coupled amplifier using BJT in common emitter configuration for a gain of 100 to amplify input voltage 1mVp-p, 10-100 KHz. Also tabulate the results for different input range.
- Design and implement LOW PASS, HIGH PASS filter using OP-AMP with cut off frequency KHz and a bandpass filter with passband of 100 KHz.
- Design and implement variable frequency and variable amplitude triangular waveform generator using OP-AMP. Tabulate the frequency range and amplitude range for the implemented circuit.
- Design and implement variable frequency and variable amplitude square waveform generator using OP-AMP. Tabulate the frequency range and amplitude range for the implemented circuit.

Learning Outcomes:

- Upon completing the course, students will be able to design, test and implement any Analog or Digital circuit by making use of the various tools and instruments available in the Electronics Workshop.

BOOKS RECOMMENDED:

1. K. A. Navas, "*Electronics Lab Manual*", Volume I, PHI, 5th Edition, 2015, ISBN: 9788120351424
2. R.A Penfold, "*Electronic Projects in Workshop*", Newnes Technical Books
3. T.K Hamingway, "*Electronic Designer's Handbook*", Business Books Limi

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER4S4	L	T	P	L	T	P	Total
ENGINEERING ECONOMICS	0	0	1	0	0	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

COURSE CONTENTS

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, and Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income - Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

- Upon completing the course, students will be able to:
- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.
- Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

BOOKS RECOMMENDED:

1. C S Park, "*Contemporary Engineering Economics*", Pearson Education, 2002.
2. J S Chandan, "*Statistics for Business and Economics*", Vikas Publishing.
3. H. L. Ahuja, "*Principles of Microeconomics*", S. Chand (G/L) & Company Ltd, 2002.
4. D. N. Dwivedi, "*Macroeconomics Theory and Policy*", Tata McGraw-Hill Publishing Company, 2010.
5. S Damodaran, "*Managerial Economics*", Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references

INFORMATION TECHNOLOGY DEPARTMENT
_SCHEME & SYLLABUS
IIInd YEAR

Semester - IV

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	AIR4C1	Numerical & Optimization Techniques	PC	3-1-0	4
2.	ITR4C2	Operating Systems	PC	3-1-1	4+1(P)
3.	ITR4C3	Software Engineering	PC	3-1-1	4+1(P)
4.	ITR4C4	Database Management System	PC	3-1-1	4+1(P)
5.	ITR4G2	Digital Communication Engineering	GE	3-1-0	4
6.	ITR4L2	Smart Systems Lab	--	0-0-1	1
7.	SIR4S4	Communication Skills	--	2-0-0	2
8.	ITR4V4	Comprehensive Viva - IV	Virtual	0-0-4	4
			Total Credits		30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
AIR4C1: Numerical and Optimization Techniques	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.
- The optimization techniques makes the students aware of the various techniques, which provides an analytical and objective basis for decisions.

Prerequisites: Basic knowledge of determinants, matrices, differentiation and integration of functions, vector algebra, and probability theory.

COURSE CONTENTS

UNIT-I

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation: Gauss-Seidel, Gauss Jacobi's and relaxation methods. Numerical solution of I order ordinary differential equation: solution by Euler's and Runge's methods.

UNIT-II

Interpolation: Finite difference operators, Newton's and central difference interpolation formulae, divided differences, Lagrange's interpolation. Numerical differentiation using Newton's formulae, maxima and minima. Numerical integration- General quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.

UNIT-III

Linear Programming: Formulation of LP problem, solution by graphical, simplex, big M and two phase methods, duality and dual simplex method, degeneracy and sensitivity analysis.

UNIT-IV

Assignment models: Definition, mathematical formulation, balanced and unbalanced assignment problems, Hungarian method of solution. Transportation Problems: Definition, mathematical formulation, balanced and unbalanced transportation problems, degeneracy and its resolution.

UNIT-V

Game Theory: Definitions and terminologies of Matrix game theory, Fundamental theorem of matrix games theory, game with mixed strategies and principle of Dominance. Dynamic programming- Characteristics, dynamic programming approach of solving LPP, optimal subdivision problem, dynamic programming under certainty.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.
- Use optimization techniques to provide a mathematical model to represent complex functional relationships.

Books Recommended:

1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
3. Hillier, F. S., Lieberman, G. J. – Introduction to Operation Research, 8th Ed., New York, McGraw- Hill, 2005.
4. Taha, H. A. – Operations Research: An Introduction, 7th ed., Macmillan Publication Co., 2003.
5. P K Gupta, D S Hira, Operations Research, S. Chand., 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Tech.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR4C2	L	T	P	L	T	P	Total
Operating System	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management.

Pre requisites: Basic knowledge of Data Structures and Computer Organization.

COURSE CONTENTS

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non-preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance

UNIT-IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation.

Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File

System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

1. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley. [2]. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India [3]. Tanenbaum, Modern Operating Systems, PHI.
2. W. Stalling, Operating Systems, Macmillan.
3. H. M. Dietel, Operating Systems, Addison Wesley Longman.
4. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
5. Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

List of Practical:

1. Experiments to understand operating system (Ubuntu) installation process, file system partitioning and dual boot setup.
2. Experiment to learn command line interface (shell) and exploring various commands of UNIX.
3. Writing programs to create and execute shell script.
4. Program to implement various algorithms for process scheduling.
5. Program to implement various algorithms for page replacement activity in memory management.
6. Writing programs to use inter process communication constructs (File sockets/ Shared memory).

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
ITR4C3		L	T	P	L	T	P	Total
Software Engineering		3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours								

Learning Objectives:

- To Understand the Software Engineering Practice & Process Models.
- Familiarize students with different software life cycle models.
- Understand the importance of the software development process.
- Understand the importance of modelling and modelling languages.
- Design and develop correct and robust software products.

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Software Engineering process: Basic concepts of System Design, Software life cycle, Software process models: Linear Sequential model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes, CMM.

UNIT-II

Requirement Analysis and Specification: Function and Non-functional requirements. Requirement Sources and Elicitation Techniques, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use Cases building the Analysis Model, Negotiating Requirements, Validating Requirements.

UNIT-III

Software Design: Overview of System Design, Decomposing the system, System Design Concepts, System Design Activities, Addressing Design Goals, Managing System Design, Design for Web Apps, Design Issues for Web Engineering, Web E Design Pyramid, Interface Design, Architecture Design – Navigation Design – Component Level Design

UNIT-IV

Testing: Testing Strategies, Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Object Oriented Software, Validation Testing, System Testing, The Art of Debugging, Software quality Assurance, Software Reliability, safety critical software development process.

UNIT-V

Software Maintenance: Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering, Project Metrics

Learning Outcomes:

Upon completing the course, students will be able to:

- A clear understanding of Software Engineering concepts.
- Knowledge gained of Analysis and System Design concepts.
- Ability to manage change during development.
- Basic idea of the SOA and AOP concepts

BOOKS RECOMMENDED:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw – Hill, Sixth Edition
2. Ian Sommerville "Software Engineering", Pearson Edu, 9th edition, 2010.
3. Hans Van Vliet, "Software Engineering: Principles and Practices", 2008.
4. Richard Fairley, "Software Engineering Concepts", 2008

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Prepare SRS for email or window explorer domain problem.
2. Using COCOMO model estimate effort for email or window explorer domain problem.
3. Draw E-R diagram, DFD for the project problem of your choice.
4. Draw Use Case diagram for facebook.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR4C4 Database Management System	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To understand the need of databases, its architecture and schemas.
- To familiarize students with representing domains using entity-relationship modelling.
- How to design a normalized schema in the relational data model.
- Develop skills in students to implement schema and query using SQL.
- Develop ability to develop database applications based on the requirements.

Prerequisites: Knowledge of Data Structures and Computer Programming and some topics of operating systems.

COURSE CONTENTS

Unit-I

Introduction: Database Environment: Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit-II

Database Analysis & Modeling: Introduction to Data Analysis and Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs- Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues.

Unit-III

Database Design: Introduction to Logical Database Design, Relational Data Model – Codd's Rules, Relational Algebra etc.; Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc..

Unit-IV

System Implementation & Transaction Processing: Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs Views, Triggers, Cursors etc; Transaction Processing – Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking etc.

Unit-V

Advance Topics: File Organization and Indexes, Hashing Techniques, B-trees, B+ Trees etc; Database Recovery, Database Security, Introduction to Data Warehousing and Data Mining, Emerging Database Technologies and Applications etc., Overview of MySQL.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand the fundamentals of relational database system including: data models, database architectures and database manipulations.
- Understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using DBMS such as MySQL.
- Be familiar with managing database systems.
- Understand new developments and trends in databases.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
3. A First Course in Database Systems, By J. Ullman, J. Widom, 3rd Edition, Pearson Education, 2014.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.
5. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
6. MySQL : The Complete Reference, 1st Edition, McGraw Hill Education, 2004.

List of Assignments:

During the learning of course, students need to do assignments:

1. Designing an E-R model.
2. Solving basic SQL assignments.
3. Solving intermediate SQL assignments involving Nested and Join queries.
4. Using PL/SQL constructs involving procedures, triggers, views etc.
5. Exploring how transaction processing is handled by MySQL.
6. Minor Project on developing a database application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)				
Subject Code & Name		Instructions Hours per Week		Credits				
ITR4G2		L	T	P	L	T	P	Total
Digital Communication Engineering		3	1	-	3	1	-	4
Duration of Theory Paper:3 Hours								

Learning Objectives:

- To review the basic Fourier techniques and its application in these processes.
- To provide knowledge of basic principles of analog and digital communication.
- To introduce the various processes like sampling, digital coding techniques, modulation and channel coding techniques that are used in modern telecommunication system.
- To give exposure to quantitative method of measuring information and determining the capacity of communication system.
- To provide knowledge of spread spectrum techniques.

Pre requisites: Basic exposure to signals and systems.

COURSE CONTENTS

UNIT-I

Review of Fourier techniques, Fourier techniques for linear system analysis, Fourier transform properties convolution, Error Function and complimentary error function, Introduction to analog modulation techniques like AM, FM, PM.

UNIT-II

Line coding: NRZ, RZ, Biphasic, Duo binary etc. their comparison and spectrum associated with their wave forms, bandwidth of digital data. Signal and Spectra: classification of signals, Parseval's theorem, energy spectral density, power spectral density, auto-correlation, crosscorrelation, random variables.

UNIT-III

Sampling and quantization, Digital coding techniques, PCM, DPCM, ADPCM, DM, ADM, vocoders, matched filter. Digital modulation techniques, BPSK, QPSK, MSK, performance analysis and comparison of digital modulation techniques in presence of noise.

UNIT-IV

Information theory: concept of amount of information, entropy, information rate, coding to increase average information per bit, Huffman coding, channel capacity, Shannon's theorem of channel capacity. Channel coding: Linear block codes, systematic Linear blocks codes, parity check matrix, syndrome testing, cyclic codes, hamming codes.

UNIT-V

Introduction to spread spectrum techniques – spread spectrum overview, spreading sequences, properties of spreading sequences, spreading gain, direct sequence spread spectrum system, jamming margin, frequency hopping system, spread spectrum applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand frequency domain analysis and its importance.
- Understand about the digital data transmission using line coding.
- Understand the working of transmitter and receiver in digital communication system.
- Understand how to detect and correct the errors introduced during the transmission.
- Understand basics of secured communication using spread spectrum techniques.

BOOKS RECOMMENDED:

- 1.Lathi B.P., “Modern Analog and Digital Communication Systems”, Oxford Univ. Press, Third edition.
- 2.Taub & Schilling, “Principal of Communication System”, Tata McGraw Hill publication, o Fourth edition, 2007.
- 3.J.G. Proakis, “Digital Communication”, McGraw Hill publication, Fourth edition, 2001.
- 4.Haykins Simon, “Digital Communication”, Wiley Publication, Third edition, 2007.
- 5.Haykins Simon, “Analog and Digital Communication”, Wiley Publication, Third edition, 2007.
- 6.Bernard Sklar, “Digital communication”, Pearson Education, Second edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Technology) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
Smart System (ITR4L2)	0	0	1	0	0	1	1
Duration of Practical: 2 Hours							

Learning Objectives:

- To provide knowledge of different Smart System applications.
- To familiarize students with Arduino as IDE, programming language & platform.
- To provide knowledge of Arduino boards and basic components.
- Develop skills to design and implement various smart system application.

List of Experiments:

Following is the list of experiments to be carried out using Arduino boards and other peripheral devices:

1. Digital Input & Digital Output
2. Experiments on digital input and digital output on Arduino Mega board and using LED and Buzzer.
3. Analog Input & Analog Input
4. Experiments on analog input and analog output on Arduino Mega board using PWM. Different outputs on LED.
5. LCD Display
6. Experiment on LCD display:-Print numbers, Name, Time etc.
7. Serial Port
8. Serial Communication between Arduino board and PC:-character send and received, Read and display voltage
9. DC Motor Control □
10. Experiments on DC Motor to control motor speed and direction of rotation. Servo Motor Control
11. Experiments on servo Motor to rotate servo motor.
12. Stepper Motor Control
13. Experiments on Stepper Motor to rotate bidirectional.
14. TV Remote
15. Experiments on TV Remote with LCD.
16. Timer
17. Experiments with Timer:-play tones, time interval measurement etc.

18. Ethernet
19. Experiment on Ethernet with web page static IP
20. Bluetooth & Wi-Fi
21. Experiments on Blue tooth and Wi-Fi

Learning Outcomes:

Upon completing the course, students will be:

- Familiar with Arduino environment and its applications.
- Able to understand Arduino programming with C++.
- Able to Design Smart systems applications.
- Learn and understand about any new IDE, compiler, and MCU chip in Arduino compatible boards or similar types.

Devi Ahilya University, Indore, Institute of Engineering & Technology				II Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SIR4S4							
Communication Skills	2	-	-	2	-	-	2
Duration of Theory Paper: 2 Hours							

Learning Objectives: introduced to skills involved in making a presentation at a conference.

- To help students acquire the basics of interpersonal skills and public speaking. To improve their communication skills and ability to understand others
- To provide the knowledge of Professional Speaking.
- To develop skills involved in making a presentation at a conference.
- To develop understanding about Dressing Sense, Telephone and Mobile Etiquettes.

COURSE CONTENTS

UNIT-I

Introduction to Communication: Purpose of Communication; Process of Communication; Importance of Communication in Business; Differences between Technical and General Communication; Barriers to Communication; Measures to Overcome the Barriers to Communication. Objectives and Principles of Communication.

UNIT-II

Types of Communication & Listening Skills: Types of Communication; Verbal Communication-Importance of verbal communication- Advantages of verbal communication, Significance of Non-verbal Communication. Listening Process: Classification of Listening, Purpose of Listening, Common Barriers to the Listening Process, Measures to Improve Listening. Listening as an Important Skill in Work Place.

UNIT-III

Communication Network: Scope and Types of Communication Network; Formal and Informal Communication Network; Upward Communication; Downward Communication; Horizontal Communication; Diagonal Communication.

UNIT-IV

Oral Communication Skills Attire and Etiquettes: Oral Business Presentation and Public Speaking: Self-Monitoring as tool for Public Speaking; Purpose, Analysis of Audience, Steps in Making a Presentation, Delivering a Presentation. Dressing Sense and Telephone/Mobile Etiquettes.

UNIT-V

Employment Communication – Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process; Job Interview Techniques-

Manners and etiquettes to be maintained during an interview. **Group Discussion;** Purpose, Methods and Importance

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Analyze different Communication Pattern.
- Understand Audience while speaking publically.
- Implement Interview Technique and Group Discussion.
- Develop understanding toward making own Style of Communication.

Suggested Readings:

1. Pal, R. & Korlahalli, J.S. Essentials of Business Communication, Sultan Chand & Sons, New Delhi.
2. Sethi, J & et al. A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.
3. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
4. Prasad, P. Communication Skills, S.K. Kataria& Sons.
5. A.S. Hornby's. Oxford Advanced Learners Dictionary of Current English, 7th Edition.
6. Bill Scott, The Skills of Communication, Bombay, Jaico
7. Ronald E. Dulek & John S. Fielden, Principles of Communicatin, New York, McMillan.

**ELECTRONICS & TELECOMMUNICATION ENGINEERING
SCHEME&SYLLABUS
IInd YEAR**

Semester-IV

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	ETR4C1	COMPUTER ORGANIZATION AND ARCHITECTURE	PC	3-1-0	4
2	ETR4C2	ELECTRICAL AND ELECTRONIC MEASUREMENT	PC	3-1-1	4+1(P)
3	ETR4C3	ANALOG ELECTRONICS	PC	3-1-1	4+1(P)
4	ETR4C4	ANALOG COMMUNICATION	PC	3-1-1	4+1(P)
5	ETR4G2	SIGNALS AND SYSTEMS	GE	3-1-0	4
6	ETR4L2	ELECTRONIC WORKSHOP-II		0-0-1	1(P)
7	STR4S4	ENGINEERING ECONOMICS		2-0-0	2
8	ETR4V4	COMPREHENSIVE VIVA - IV	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C1	L	T	P	L	T	P	Total
COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- To identify the elements of modern instructions sets and their impact on processor design.
- To explain the function of each element of a memory hierarchy,
- To identify and compare different methods for computer I/O.

Prerequisite(s): Knowledge of logic circuits - combinational and sequential

COURSE CONTENTS

Unit I: Computer Organization

Computer types, Structure with basic computer components, Function in brief with instruction fetch and execute, Interrupts and I/O communication, Interconnection structure, bus interconnection, Multiple Bus hierarchies, Elements of bus design Performance metrics and measurement

Unit II: Computer Memory System

Characteristics of memory system, Memory hierarchy, Cache Memory- Cache memory principles, Elements of cache design- cache address, size, mapping functions, replacement algorithms, write policy, Internal Memory- semiconductor memory, External Memory- Hard Disk organization, RAID

Unit III: Input and Output System

I/O modules- Module function and I/O module structure, Programmed I/O , Polling I/O, Interrupt driven I/O , DMA function, Synchronous and Asynchronous serial data communication, Computer peripherals like keyboard, mouse, printer, scanner and display devices

Unit IV: Processor Organization

Evolution of Intel processor architecture- 4 bit to 64 bit, Control unit Hardwired and microprogrammed, concept of pipelining , Study of microprocessor 8085,Functional pins and Register organization, Memory mapped I/O and I/O mapped I/O schemes,

Unit V: Instruction Set and Assembly Language Programming

Addressing modes and Formats- immediate, direct, indirect, register, register indirect, displacement and stack, Instruction Cycle machine cycle and Data flow, 8085 instruction set and assembly programming, Time delay concept , stack and subroutines, Interrupt handling, Instruction set architecture RISC and CISC

Learning Outcomes:

On completion of the course, student will be able to :

- Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
- Analyze the performance of commercially available computers.
- To develop logic for assembly language programming

BOOKS RECOMMENDED

1. William Stallings, “*Computer Organization and Architecture*”, Prentice Hall of India, Sixth Edition.
2. A. Tannenbaum, “*Structured Computer Organization*”, Pearson Education, 2002.
3. Patterson & Hennessy, “*Computer Organization and Design*”, Morgan Kaufmann, 2007
4. Ramesh S. Gaonkar, “*Microprocessor, Architecture, Programming, and Applications with the 8085*”, Penram International Publication, 5/e

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C2 ELECTRICAL AND ELECTRONIC MEASUREMENT	L	T	P	L	T	P	Total
	Duration of Theory Paper: 3 Hours	3	1	2	3	1	1

Learning Objectives:

- To understand students how different types of meters work and their construction.
- To To introduce students to monitor, analyze and control any physical system.
- provide a student a knowledge to design and create novel products and solutions for real life problems.
- To introduce students a knowledge to use modern tools necessary for electrical projects.

Prerequisites(s): Basic Electrical Egg and Basic Electronics

COURSE CONTENTS

UNIT-I

Basic concept of Measurements and Instruments, Measurement Methods, Generalized measurement System, Classification of Instruments, Static & Dynamic Characteristics, Errors & Uncertainty measurement of system, Linear & Non-linear Systems.

UNIT-II

Operation principles of Analog Instruments - Moving coil, Moving iron, PMMC, Dynamometer and Induction type instruments, Measurement of Voltage, Current, Power, Power Factor, Energy, Instrument Transformer - current and potential transformer, Measurement of Phase & Frequency.

UNIT-III

Measurement of Resistance- low, medium and high resistance measurement, A.C. Bridges- general equation, Potentiometer- DC potentiometer, Multi-range potentiometer, AC potentiometer and their applications, High Frequency Measurement , Twin T & Bridge Networks, Q-meter and its applications.

UNIT-IV

Display Devices I- Construction & working of Basic CRO, its Components (Deflection plates, Screen, Aquadag, Time Base Generator, Oscilloscope Amplifiers), Measurements of phase and frequency (Lissajous Patterns), Types of CRO, Special types of CRO, Types of CRO Probes.

UNIT-V

Display Devices II- Digital Voltmeter (ramp type DVM, Integrating and Potentiometric type DVMs, Signal Generator, Function Generator, Wave Analyzer, Distortion Analyzer, Spectrum Analyzer, Frequency Counter, Display Devices & Recorders.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R, L, C, Voltage, Current, Power factor, Power, Energy.
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.
- Ability to use Digital voltmeters

BOOKS RECOMMENDED:

1. A.K.Sawhney & Puneet Sawhney, “*A Course in Electrical and Electronic measurements and Instrumentation*”, 7/e, Dhanpat Rai & Co.(P) Ltd.,2005
2. Albert D.Helfrick & William D.Cooper, “*Modern Electronic Instrumentation and measurement Technique*”, Low Price Edition, Pearson Education, 2005
3. Ernest O.Doebelin, “*Measurement Systems Application and Design*”, 5/e, Tata McGraw – Hill Publishing Company Ltd., 2004
4. H.S.Kalsi, “*Electronic Instrumentaion*”, Technical Education Series, Tata McGraw –Hill Publishing Company Ltd.,2001
5. Alan S.Morris, “*The Essence of Measurement*”, Eastern Economic Edition, Prentice Hall of India Private Limited.,1997

List of Practical Assignments:

- To calibrate test Ammeter with reference Ammeter and hence detection of deviation of the test ammeter from reference ammeter using comparison method.
- To calibrate test Voltmeter with reference Voltmeter and hence detection of deviation of the test Voltmeter from reference Voltmeter using comparison method.
- To calibrate test Wattmeter with reference Wattmeter and hence detection of deviation of the test Wattmeter from reference Wattmeter using comparison method.
- To calibrate test Energy meter with reference Energy meter and hence detection of deviation of the test Energy meter from reference Energy meter using comparison method.
- To study Hay’s Bridge and hence determination of unknown value of Self Inductance of given coil using Hay’s Bridge.
- To study Anderson Bridge and hence determination of unknown value of Self Inductance of given coil using Anderson Bridge.
- To study Schering’s Bridge and hence determination of unknown value of Capacitance of given coil using Schering’s Bridge.

- To study Maxwell's Bridge and hence determination of unknown value of Inductance of given coil using Maxwell's Bridge.
- To study Wien's Bridge and hence determination of unknown value of Capacitance of given coil using Wien's Bridge.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C3	L	T	P	L	T	P	Total
ANALOG ELECTRONICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To recall various BJT parameters, connections and configurations.
- To Explain and Demonstrate BJT Amplifier, Hybrid Equivalent and Hybrid Models.
- To explain construction and characteristics of JFETs and MOSFETs.
- To explain various types of FET biasing, and demonstrate the use of FET amplifiers.
- To Demonstrate and Construct Frequency response of BJT and FET amplifiers at various frequencies.
- To Define, Demonstrate and Analyze Power amplifier circuits in different modes of operation.
- To Demonstrate and Apply Feedback and Oscillator circuits using FET.

Prerequisites: Basic knowledge and understanding of semiconductor devices and operation required.

COURSE CONTENTS

Unit I

BJT AC Analysis: BJT AC Analysis:

BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration. Darlington connection-DC bias; The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit Fixed bias, Voltage divider, Emitter follower configuration; Complete Hybrid equivalent model, Hybrid π Model.

Unit II

Field Effect Transistors:

Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET. **FET Amplifiers:**

JFET small signal model, Fixed bias configuration, Self-bias configuration, Voltage divider configuration, Common Gate configuration. Source-Follower Configuration, Cascade configuration.

Unit III

BJT and JFET Frequency Response:

Logarithms, Decibels, Low frequency response – BJT Amplifier with RL, Low frequency response FET Amplifier, Miller effect capacitance, High frequency response – BJT Amplifier, High frequency response-FET Amplifier, Multistage Frequency Effects.

Unit VI

Feedback and Oscillator Circuits:

Feedback concept, Feedback connection types, Voltage Series, Voltage Shunt, Current Series, Current Shunt, practical feedback circuit Phase shift oscillator, wien bridge oscillator, colpitts Oscillator, hartely oscillator, Crystal Oscillator.

Unit V

Power Amplifiers:

Definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation and circuits, Amplifier distortion, Class C and Class D amplifiers. Voltage regulators: Discrete transistor voltage regulation - Series and Shunt Voltage regulators.

Learning Outcomes: After studying this course, students will be able to:

- Acquire knowledge of and Working principles, characteristics and basic applications of BJT and FET.
- Single stage, cascaded and feedback amplifier configurations and Frequency response characteristics of BJT and FET.
- Analyze the performance of FET amplifier in CS configuration and Power Amplifiers and Oscillator circuits.
- Interpretation of performance characteristics of transistors amplifiers, frequency Response and Oscillators.
- Apply the knowledge gained in the design of transistorized circuits, amplifiers and Oscillators.

BOOKS RECOMMEDED

1. Adel S. Sedra and Kenneth C. Smith, “*Micro Electronic Circuits Theory And Application*,” 5th Edition ISBN:0198062257
2. Behzad Razavi, “*Fundamentals of Microelectronics*”, John Weily ISBN 2013 978-81-265-2307-8
3. J.Millman & C.C.Halkias,”*Integrated Electronics*”, 2nd edition, 2010, TMH. ISBN 0-07-462245-5
4. K. A. Navas, “*Electronics Lab Manual*”, Volume I, PHI, 5th Edition, 2015, ISBN: 9788120351424.

List of Practical Assignments:

1. Realize BJT Darlington Emitter follower with and without bootstrapping and determine the gain, input and output impedances.
2. Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain bandwidth product from its frequency response.
3. Plot the transfer and drain characteristics of a JFET and calculate its drain resistance, mutual conductance and amplification factor.
4. Design, setup and plot the frequency response of Common Source JFET/MOSFET amplifier and obtain the bandwidth.
5. Plot the transfer and drain characteristics of n-channel MOSFET and calculate its parameters, namely; drain resistance, mutual conductance and amplification factor.
6. Set-up and study the working of complementary symmetry class B push pull power amplifier and calculate the efficiency.
7. Design and set-up the RC-Phase Shift Oscillator using FET, and calculate the frequency of output waveform.
8. Design and set-up the following tuned oscillator circuits using BJT, and determine the frequency of oscillation. (a) Hartley Oscillator (b) Colpitts Oscillator
9. Design and set-up the crystal oscillator and determine the frequency of oscillation

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics & Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C4	L	T	P	L	T	P	Total
ANALOG COMMUNICATION	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The fundamentals of signals & linear time invariant systems used in communication systems.
- Knowledge of probability, random variables & random processes
- In depth knowledge of different types of analog communication system and different modulation techniques used in these systems.
- Analysis of noise and its impact on different modulation techniques.

Prerequisite(s): Basic Electronics

COURSE CONTENTS

Unit-I

Signals and Systems: Types of signals, Classification of Systems, Fourier series, Fourier transform & Its Properties, Convolution, Signal transmission through LTI Systems, Auto correlation, Cross correlation, Energy and power spectral density.

Probability, Random Variables & their moments, their significance, Gaussian & Rayleigh Probability density functions, their means and variances, Q-Function, Central limit theorem.

Unit -II

Amplitude Modulation: Need of Modulation, Block schematic of a typical communication system. AM modulation system, Modulation index, Generation (Squire Law & Switching Modulator) & Detection (Envelope & Squire Law Detector) of AM wave , Side bands & Power contents in AM Wave, DSB-SC (Balanced, Ring Modulator & Synchronous Detector), SSB-SC, Methods of generation & detection, VSB modulation, Comparison of various AM systems, Frequency division multiplexing, Group delay & phase delay.

Unit -III

Frequency Modulation: Relationships between Phase & Frequency Modulation, Narrowband FM, Wideband FM & their Spectrum, Transmission bandwidth of FM And PM signals, Methods of generation (Direct & Indirect) & detection of FM (Discriminators : Balanced,

Phase Shift And PLL Detector), Pre- Emphasis & De-Emphasis, Stereophonic FM Broadcasting.

Unit -IV

AM transmitter block diagram, TRF receiver & its limitations, Necessity of heterodyning, Super heterodyne radio receivers, IF amplifiers & selection of IF. FM transmitters, FM receivers, AGC, AVC, AFC, Dynamic Range of Receivers.

Unit -V

Random & Gaussian processes and their frequency domain analysis, Sources of noise, Noise figure and Noise figure of amplifiers in cascade, Noise bandwidth, Effective noise temperature, and quadrature components of noise, Rician noise as narrow band Gaussian noise. Performance of AM, FM in presence of low noise case.

Introduction to Digital Communication: Nyquist Sampling Theorem, Time division Multiplexing, PAM, PWM, PPM.

Learning Outcomes:

On Completion of this course the students will be able to:

- Analyze analog communications in time domain and frequency domain.
- Distinguish between different analog modulation techniques.
- Understand the importance of noise considerations in communication systems.

BOOKS RECOMMENDED:

1. Proakis and Salehi, "*Fundamentals of Communication Systems*", 1/E Pearson Education, 2005.
2. Lathi B.P., "*Analog and Digital Communication systems*", 3/E Oxford Press, 2007.
3. Haykin Simon, "*Communication Systems*", 4/E John Willey & Sons, 2006.
4. Carlson, "*Communication Systems*", 5/E McGraw Hill, 2004.
5. Taub & Schilling, "*Principles of communication systems*", 3/E McGraw Hill, 2000.
6. Singh R.P. & Sapre, "*Communication systems Analog & Digital*", 2/E TMH, 2007.

List of Practical Assignments:

- To Perform the fourier synthesis of the following signals
Square wave, Triangular wave, AM wave SC, AM wave FC
- Generation of AM Waveforms.
Waveforms generation of DSB-SC Amplitude modulation System
Waveforms generation of AM-FC System for different modulation index
- To study the working of AM receiver.
 - a. Detection of AM wave by envelope detector
 - b. Detection of AM wave by square law detector
- Receiving of AM signal using superheterodyne receiver and analyzes it.
- To modulate a message signal using FM modulator.
- To demodulate a received FM signal using FM demodulator circuit.
- To study the working of pulse width modulator and demodulator.
- To study the working of pulse amplitude modulator and demodulator.
- To study the working of pulse position modulator and demodulator.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics & Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4G2	L	T	P	L	T	P	Total
SIGNALS AND SYSTEMS	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- This course aims to provide detailed description Signals and System Analysis.
- Fourier series and Fourier transform, Laplace.
- Z Transform along with respect to SISO systems and State variable analysis for MIMO systems.

Prerequisite(s): Engineering Mathematics

COURSE CONTENTS

UNIT-I Fundamentals of Signals & Systems:

All basic Continuous time signals. Energy signal and Power signal. Continuous time systems, discrete time signals and discrete time systems. Linear Time invariant system theory and its significance to continuous time and discrete time system analysis. Linear convolution Integral and Linear convolution sum.

UNIT-2 Fourier series and Fourier Transform:

Fourier series, Different forms of Fourier series, Dirchlet conditions, Wave symmetry, Parseval theorem. Fourier Transform; its properties and applications. Symmetry properties of Fourier transform. System analysis with Fourier transform. Ideal Filters.

UNIT-3 Laplace Transform and its applications:

Laplace Transform and its properties. Region of convergence, Laplace Transform of some common functions, Initial value and Final value theorem. Inverse Laplace Transform, Transfer function, Characteristics of transfer function, Poles and Zeros, System analysis using Laplace Transform.

UNIT-4 State Variable Techniques:

Introduction, State Variable Concept, Form of state equations, State space representation of continuous time and discrete time LTI systems, solution of state equation, state transition matrix.

UNIT -5 Discrete Time Signal/Systems and Z-Transform:

Introduction, Z-Transform definition, Region of Convergence, Z-Transform of some common sequences, properties of Z-Transform, Inverse Z-Transform, System function of discrete time, LTI Systems, Convolution Theorem, Complex Convolution Theorem.

Learning Outcomes:

On Completion of this course the students will be able to:

- The focus of this course is to familiarize the students with the concept of Fourier transform & Fourier series.
- Analyze the spectral characteristics of signals using Fourier analysis.
- Classify systems based on their properties and determine the response of LTI
- Identify system properties based on impulse response and Fourier analysis.
- Apply transform techniques to analyze continuous-time and discrete-time

BOOKS RECOMMENDED:

1. Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin, “*Signals and Systems*”, Pearson 4th Edition
2. Hwei P. Hsu (Schaum's Outline Series), “*Signals and Systems*”, TMH Edition
3. A. Anand Kumar, “*Signals and Systems*”, PHI 3rd Edition
4. A.V. Oppenheim et al, “*Signals and Systems*”, 2nd Edition, Pearson 2003
5. Smarajit Ghosh, “*Signals and Systems*”, Pearson
6. Simon Haykin, “*Signals and Systems*” 2nd edition, Wiley, 2008.
7. B P Lathi, “*Digital and Analog Communication Systems*” 4th edition, Oxford University Press, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics & Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4L2	L	T	P	L	T	P	Total
ELECTRONIC WORKSHOP-II	0	0	1	0	0	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize students with various Electronic devices and their specifications.
- Develop skill for Design and Testing of different types of Electronic subsystems using Analog and Digital IC's
- Familiarize students with PCB layout tool to prepare PCB print for assigned project.
- Develop skills of writing a structured technical document for project and its presentation.
- Develop ability to diagnose faults and their rectification.

COURSE CONTENTS

List of Exercises / Experiments

1. Familiarization /Identification of electronic components with specification and Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.
2. Drawing of electronic circuit diagrams using EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.
3. Familiarization/Application of testing instruments and commonly used tools like Multimeter, Function generator, Power supply, CRO etc. Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.
4. Testing of electronic components Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter and different IC's using IC tester.
5. Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
6. Assembling electronic circuit/system on general purpose PCB, testing and show the functioning (Total two projects. **Any one from 1-13 and one from 14-18 project list**)

List of Projects

1. Fastest Finger First Indicator Project

2. Fire Alarm Circuit
3. Plant Watering Watching Indicator
4. Clap switch for operating electric equipment like fan, bulb
5. Mobile Battery Charger
6. 7 Segment Counter
7. Metal Detector
8. Electronic letter box
9. Traffic Light circuit
10. Light-Sensitive Fire Alarm
11. Infrared Motion-Sensing Relay Switch
12. LPG Leakage Detector

Learning Outcomes:

- Upon completing the course, students will be able to design, test and implement any Analog or Digital circuit by making use of the various tools and instruments available in the Electronics Workshop.

BOOKS RECOMMENDED:

1. K. A. Navas, "*Electronics Lab Manual*", Volume I, PHI, 5th Edition, 2015, ISBN: 9788120351424
2. R.A Penfold, "*Electronic Projects in Workshop*", Newnes Technical Books
3. T.K Hamingway, "*Electronic Designer's Handbook*", Business Books Limited.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics & Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
STR4S4	L	T	P	L	T	P	Total
ENGINEERING ECONOMICS	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

COURSE CONTENTS

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale
Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income - Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy-Meaning, Objectives, Tools.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.
- Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

BOOKS RECOMMENDED:

1. C S Park, “*Contemporary Engineering Economics*”, Pearson Education, 2002.
2. J S Chandan, “*Statistics for Business and Economics*”, Vikas Publishing.
3. H. L. Ahuja, “*Principles of Microeconomics*”, S. Chand (G/L) & Company Ltd, 2002.
4. D. N. Dwivedi, “*Macroeconomics Theory and Policy*”, Tata McGraw-Hill Publishing Company, 2010.
5. S Damodaran, “*Managerial Economics*”, Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references.

**CIVIL ENGINEERING DEPARTMENT
SCHEME&SYLLABUS
IInd YEAR**

Semester-IV

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	AVR4C1	Engineering Geology	PC	3-1-0	4
2.	VLR4C2	Fluid Mechanics - I	PC	3-1-1	4+1(P)
3.	VLR4C3	Advanced Surveying	PC	3-1-1	4+1(P)
4.	VLR4C4	Design of RCC Structures – I	PC	3-1-1	4+1(P)
5.	VLR4G2	Environmental Engineering – I	GE	3-1-0	4
6.	VLR4L2	Lab of Engineering Geology	--	0-0-1	1
7.	SVR4S4	Communication Skills	--	2-0-0	2
8.	VLR4V4	Comprehensive Viva - IV	Virtual	0-0-4	4
			Total Credits		30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (CIVIL)			
Subject Code & Name	Instructions Hours per Week			Credits			
AVR4C1	L	T	P	L	T	P	Total
Engineering Geology	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Origin, Internal and surface structures of the earth.
- Identification of the minerals types of clay minerals their properties and effects on engineering project.
- Types of rock (Igneous, Sedimentary, and Metamorphic), Civil engineering importance of rock forming minerals.
- Sedimentary processes (Weathering, erosion, deposition), Metamorphism and volcanic eruptions.
- Geological structures (Joint, veins, crack, faults, and fold), reasons of formation for each type and their side effects on the engineering projects.
- Types of Dams and Tunnels.

COURSE CONTENTS

UNIT-1

Introduction: Objects and scope of engineering geology. The origin, age and internal structure of the earth. Volcanoes, earthquakes, continental drift and isostasy, weathering, denudation and deposition, wind, river, glacial and marine erosion.

Soil formation, soil profile, geological classification of soil and concept of plate tectonics.

UNIT-2

SECTION A:- mineralogy and crystallography:

Fundamentals of mineralogy, study of common rock forming minerals, their origin, occurrence and physical properties for identification. Elements of crystallography and introduction to crystal systems.

SECTION B:-Petrology:

Composition of earth crust. Igneous sedimentary and metamorphic rocks and their mode of occurrence, structure and texture, characteristics, classification of rocks and their importance in civil engineering.

SECTION C: - Stereography and Indian geology:

General principles of stratigraphy, geological time scale, division of India in three units. Study of important Geological formation of the peninsular India. Archeans, Dharwars, Cuddapah, Vindhyan, Gondwana systems, Deccan traps.

UNIT-3

SECTION A:- Rock mechanics

Rock classification, engineering classification of intact rocks, rock quality designation, mechanical properties of rocks, tensile, compressive, shear strength, hardness, brittle failure of rock, stress

deformation characteristics of rock masses, deformation modulus and elastic constants laboratory tests on rock spacing, point load index test, high pressure permeability test, triaxial test, Brazilian test, in situ test on rocks.

SECTION B:-Structural geology:

Structures related to rocks. Dip strike and out crops. Classification and detailed studies of geological structures i.e.,. Folds, fault, joints unconformity and their importance in civil engineering.

UNIT-4

Applied geology:-

Engineering properties of rocks and their relation to rock mass deformation. Physical characters of building stones and road metals.

Influence of geological conditions of foundation and designs of buildings, stability of hill slopes and transportation routes. Geology of reservoir and dam sites, its location, strength, stability and water tightness of foundation rocks, their depth, physical characters and effects of structural features.

Tunnels-Effect of the structure of rocks competency of rocks, suitable location of a tunnels, problem of ground water seepage.

UNIT-5

Hydrology:- hydrology cycle, ground water in hydrological cycle. Origin of ground water and springs. Geological structures favoring ground water occurrence. Classification of aquifers, ground water provinces of India- their aquifers characteristics. Ground water occurrence and flow in Igneous, sedimentary and metamorphic rocks. Geophysical prospecting and water logging.

Learning Outcomes:

- The goal of the course is to increase the student's knowledge and understanding of geology, and apply this knowledge to engineering projects such as dams, landfills, rock quarries, roads, tunnels and slopes.
- Another goal is to increase the students' presentation skills, both oral and in written.

Books Recommended:

1. Subinoy Gangopadhyay, Engineering geology: Oxford university press.
2. Mukerjee P.K.A, Textbook of Geology, World Press Pvt. Ltd., Calcutta.
3. Legget R.F., Geology and Engineering, McGraw Hill.
4. Krgnine D.P. and Judd W.R., Principles of Engineering Geology, Mchgraw Hill

List of Experiments (Expandable)

1. Identification of simple rock forming minerals.
2. Identification of rock.
3. Simple map Exercises.
4. Field Visit/ Geological Excursion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E.(CIVIL ENGG)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR4C2 Fluid Mechanics - I	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The course on fluid mechanics is devised to introduce fundamental aspects of fluid flow behaviour.
- Students will learn to develop steady state mechanical energy balance equation for fluid flow systems, estimate pressure drop in fluid flow systems and determine performance characteristics of fluid machinery.

COURSE CONTENTS

UNIT-1

Introduction: Scope and Application of Fluid Mechanics: Physical Properties of fluids; density; specific weight, specific volume, specific gravity, viscosity, dynamic and kinematic viscosity, Newton's law of viscosity, classification of fluids, compressibility, cohesion, adhesion, surface tension, capillarity, vapour pressure.

Equilibrium of fluids : Pressure at a point, variation, barometer, gauges, manometers, hydrostatic forces, equilibrium of fluid in motion, floatation – stability of floating and submerged bodies, fluid masses subjected to rotation, free and forced vortices.

UNIT-II

Kinematics of Fluid flow: Velocity field, classification of flows, stream, path and streak lines, continuity equation, stream function, velocity potential, flow-nets.

Dynamics of Fluid flow: Eulers equation of motion, Bernoulli's equation, pilot tube, prandil tube, flow through openings- orifices, mouth pieces etc., flow through notches weirs, empirical formulae

UNIT-III

Dimensional Analysis & Model Study:Units and dimensions, dimensional homogeneity, Buckingham II Theorem, dimensionless numbers, principles of similitude and applications.

UNIT-IV

Flow through Pipes: Laminar flow, flow between parallel plates, measurement of viscosity, reynold's experiment, turbulent flow in pipes, solution of pipe flow problems, flow in pipe-Network- Handy Cross Method, Losses in pipes, measurement of pipe flow- orifice, nozzle, bend meters, rotameters, concept of water hammer and surges.

UNIT-V

Flow through Open Channels: classification, geometric elements, continuity, energy and momentum equations, pressure, velocity distributions, uniform flow, concept of normal depth,

chezy, manning and other formulae, best hydraulic sections, specific energy, specific force, hydraulic jump and its characteristics, gradually varied flow, surface profiles, dynamic equations.

Sessional Works: Experiments on basis principles of fluid mechanics, Practical Exams: experimental and oral exam based on above sessional work, measurement of flow in open channels.

Learning outcomes:

- The student will understand stress-strain relationship in fluids, classify their behavior and also establish force balance in static systems. Further they would develop dimensionless groups that help in scale-up and scale-down of fluid flow systems. (Unit I)
- Students will be able to apply Bernoulli principle and compute pressure drop in flow systems of different configurations (Unit II)
- Students will compute power requirement in fixed bed system and determine minimum fluidization velocity in fluidized bed (Unit III)
- Students will be able to describe function of flow metering devices and apply Bernoulli equation to determine the performance of flow-metering devices
- Students will be able to determine and analyze the performance aspects of fluid machinery specifically for centrifugal pump and reciprocating pump

Books & References Recommended:

Text Books:

1. Nagaratnam S, *Fluid Mechanics*
2. Jain A K, *Fluid Mechanics*
3. Subramanaya K, *Fluid Mechanics*
4. Modi P N & S M Seth, *Hydraulics & Fluid Mechanics*

Reference Books:

1. Chow V T, *Open Channel Hydraulics*.
2. Rangaraju K G, *Flow through open channels*
3. Streeder V L, *Fluid Mechanics*.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR4C3: Advanced Surveying	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make students aware with different advance surveying methodologies applied to carry out large scale survey works as modern instruments have largely changed the approach to survey works with the principles being same.
- To prepare the students to handle the errors they are likely to come across any large scale survey works.

COURSE CONTENTS

UNIT-I

Modern equipments for surveying : Digital levels and theodolites, Electronic Distance measurement(EDM), Total Station and Global Positioning Systems (GPS), Digital Planimeter .

UNIT-II

Surveying Astronomy: Definitions of astronomical terms, coordinate systems for locating heavenly bodies, geographic, geodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of latitude and longitude.

UNIT-III

GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datums, GPS receivers, GPS observation methods and their advantages over conventional methods. Digital Terrain Model (DTM) : Topographic representation of the terrain and generation of DTM on computers using spot heights and contour maps.

UNIT-IV

Photogrammetry : Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic.

UNIT-V

Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Geographic Information Systems (GIS) : Definition, components and advantages.

Learning outcomes:

- After studying this subject students will be able to:

- Conduct tacheometry and geodetic survey
- Apply principles of theory of errors for correction of measurements
- Apply knowledge of astronomy for solving civil engineering problems.
- Explain use of aerial camera, aerial photographs and procedure of aerial survey.
- Utilize stereoscope and parallax bars.
- Utilize total station and other modern survey instruments.
- Apply GIS in solving engineering problems

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
VLR4C4 : Design of RCC Structures – I							
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives

- To bring about an understanding of the behavior of reinforced concrete.
- To bring about an understanding of the design philosophies.
- To perform analysis and design of reinforced concrete members.

COURSE CONTENTS

Unit-I.

Basic Principles of Structural Design: Basic concepts of Reinforced concrete, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design, Partial load factors. Neutral Axis Depth, limiting values of neutral axis for different grades of steel, Balanced, Under Reinforced and Over Reinforced Sections, Limit state of collapse in flexure, assumptions, stress strain curves for concrete and steel, Stress block, Moment of Resistance of beam Sections.

Unit-II

Design of Beams by L.S.M: Limit state of collapse in shear, design shear strength of concrete, design strengths of vertical / inclined stirrups and bent up bars in, Design of beam for flexure, shear and bond. Design of singly reinforced rectangular beams, Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement, Redistribution of moments in continuous beams.

Unit-III

Design of slabs by L.S.M : Classification of slabs , Effective spans ,Imposed loads on slabs (IS: 875), strength and stiffness requirements, minimum and maximum permitted size, spacing and area of main and secondary reinforcement as per IS 456 -2000, Design of one way cantilever, simply supported, slabs and sunshades, Design of continuous slabs using B.M coefficients, check for stiffness, curtailment of tension reinforcement, Tension and torsion reinforcement requirement.

Unit -IV.

Design of columns by L.S.M: Classification of Columns, Limit state of collapse in compression, assumptions, limiting strength of short, axially loaded compression members, effective length of compression members, slenderness limits for columns, minimum eccentricity for column loads, longitudinal and transverse reinforcement as per I S 456-2000, Design of axially loaded short columns with lateral ties / helical reinforcement

Unit -V.

Design of column footings Types of footings, Footings with uniform thickness and sloped footings, minimum thickness, critical sections, minimum reinforcement, distribution of reinforcement, development length, anchorage, cover, minimum edge thickness requirements as per IS 456-2000 – Design of isolated footing (square and rectangular) and combined footings by limit state,

Unit -V.

Design of Staircases by L.S.M: Types of stairs according to geometry and structural behavior planning a staircase, effective span of stairs, effective breadth of flight slab, distribution of loads on flights Staircases with waist slab having equal and unequal flights with different support conditions, Slab less tread-riser staircase.

NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of

IS:456. Use of SP-16 (Design aids)

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the general mechanical behavior of reinforced concrete.
- To understand the principles involved in analysis and design of reinforced concrete structures.
- Analyze and design reinforced concrete flexural members.
- Analyze and design reinforced concrete compression members.
- Analyze and design for vertical and horizontal shear in reinforced concrete.
- Analyze transfer and development length of concrete reinforcement.
- Analyze and design for deflection and crack control of reinforced concrete members.
- To employ the code of practice for design of reinforced concrete structural members and elementary structural systems.

Suggested Books: -

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju.

Devi Ahilya University Indore, India Institute of Engineering & Technology				II B.E. (CIVIL ENGG) (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR4G2 Environmental Engineering-I	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objectives:

- To provide knowledge of Water Supply scheme to fulfil public demand.
- To learn the Water treatment technological options for different quality of water.
- To learn the sewerage treatment process for community waste water.
- To know about the different pipe material and sewer materials and should be able to select the most appropriate material.

Pre-requisites: Engineering Chemistry.

COURSE CONTENTS

Unit – I

Planning for Water Supply System:

Public water supply system, planning, objectives, Design period, Population forecasting-different methods limitations and field practice., Water demand, fluctuation in demand (daily, hourly and seasonal), Sources of water and their characteristics,

Water Quality Characterisation and standards, types of impurities and their sources and effects, water borne diseases, examination of water (physical, chemical, bacteriological and sanitary), significance of important parameters, Water Quality Index.

Unit - II

Conveyance & Distribution System:

Water supply Intake structures, Pipes and conduits for water, Materials and class of pipes-specification, merits & demerits of pipes Cast iron ,mild steel pipes, asbestos cement, R.C.C and pre-stressed pipes. Selection of pump and pipe materials, types of pumps, Types of distribution systems, layout of Distribution System, Analysis of Water Distribution system by Hardy Cross Method.

Unit – III

Water Treatment:

Objectives of water treatment, unit operations and processes. Methods of water treatment, theory and design of sedimentation, coagulation, filtration, disinfection, aeration, water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

Unit-4

Quality of Waste Water

Characterisation & composition physical, chemical, microbiological, primary parameters of pollution BOD, COD, total solids, volatile solids total organic carbon, nitrogen & its forms, pH, Chlorides, Colour, Toxic Substances, Micro Organisms etc.

Unit - 5

Design of Sewerage System:

Types of systems, sanitary sewers, storm sewers, combined and partially combined sewers, quantity of sewerage, infiltration, design period, factors, self cleaning velocity, maximum velocity depth/section of sewers, minimum size, slope, alignments. Sewer Appurtenances like Manholes, drop manhole, lamp hole, ventilating shafts etc, Use of Manning's Formula, Partial Flow in Sewers, Design of Sewers from Flow Charts, Pumping of Sewage.

Learning Outcomes: upon completion of this course the students will be able to

- Design the Water Treatment plant for a given population and characteristics of raw water.
- Project the population of community for given design period by different methods.
- Design the Sewerage system for domestic waste water.
- To understand the layout of distribution system to supply water to community.

Books & References Recommended :

- 1.Kshirsagar K.R., *Water Supply Engg.*
- 2.Kshirsagar K.R., *Sanitary Engg.*
- 3.Hussain, *Water Supply and Sanitary Engg.*
- 4.Birdi G.S., *Public Health Engg.*
- 5.Punmia, B.C. *Water Supply Engineering* - Laxmi Publications (P) Ltd. New Delhi
- 6.Garg S.K., "Environmental Engineering", Vol 1, Khanna Publishers, New Delhi 2005.
- 7.Garg S.K., "Environmental Engineering", Vol 2, Khanna Publishers, New Delhi
Relevant IS Codes.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (CIVIL ENGG.)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SVR4S4							
COMMUNICATION SKILLS	2	-	-	2	-	-	2
Duration of Theory Paper: 2 Hours							

Learning Objectives: introduced to skills involved in making a presentation at a conference.

- To help students acquire the basics of interpersonal skills and public speaking.
- To improve their communication skills and ability to understand others
- To provide the knowledge of Professional Speaking.
- To develop skills involved in making a presentation at a conference.
- To develop understanding about Dressing Sense, Telephone and Mobile Etiquettes.

COURSE CONTENTS

UNIT-I

Introduction to Communication: Purpose of Communication; Process of Communication; Importance of Communication in Business; Differences between Technical and General Communication; Barriers to Communication; Measures to Overcome the Barriers to Communication. Objectives and Principles of Communication.

UNIT-II

Types of Communication & Listening Skills: Types of Communication; Verbal Communication-Importance of verbal communication- Advantages of verbal communication, Significance of Non-verbal Communication. Listening Process: Classification of Listening, Purpose of Listening, Common Barriers to the Listening Process, Measures to Improve Listening. Listening as an Important Skill in Work Place.

UNIT-III

Communication Network: Scope and Types of Communication Network; Formal and Informal Communication Network; Upward Communication; Downward Communication; Horizontal Communication; Diagonal Communication.

UNIT-IV

Oral Communication Skills Attire and Etiquettes: Oral Business Presentation and Public Speaking: Self-Monitoring as tool for Public Speaking; Purpose, Analysis of Audience, Steps in Making a Presentation, Delivering a Presentation. Dressing Sense and Telephone/Mobile Etiquettes.

UNIT-V

Employment Communication – Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process; Job Interview Techniques- Manners and etiquettes to be maintained during an interview. **Group Discussion;** Purpose, Methods and Importance

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Analyze different Communication Pattern.
- Understand Audience while speaking publically.
- Implement Interview Technique and Group Discussion.
- Develop understanding toward making own Style of Communication.

Suggested Readings:

1. Pal, R. & Korlahalli, J.S. Essentials of Business Communication, Sultan Chand & Sons, New Delhi.
2. Sethi, J & et al. A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.
3. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
4. Prasad, P. Communication Skills, S.K. Kataria& Sons.
5. A.S. Hornby's. Oxford Advanced Learners Dictionary of Current English, 7th Edition.
6. Bill Scott, The Skills of Communication, Bombay, Jaico
7. Ronald E. Dulek & John S. Fielden, Principles of Communicatin, New York, McMillan.

**COURSE SCHEME FOR B.E II YEAR-PART TIME (CBCS)
MECHANICAL ENGINEERING DEPARTMENT**

Semester-IV

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	MEP4C1	THEORY OF MACHINE	PC	2-1-1	4
2	MEP4C2	MECHATRONICS	PC	2-1-1	4
3	MEP4C3	FLUID MECHANICS	PC	2-1-1	4
4	MEP4G1	APPLIED THERMODYNAMICS	GE	2-1-0	3
5	MEP4V4	COMPREHENSIVE VIVA -IV	VIRTUAL	0-0-4	4
TOTAL CREDITS					15(A)+4(V)

Devi Ahilya University, Indore Institute of Engineering & Technology		II Year B.E. (Mechanical Engg.) (Part Time)					
Subject Code & Name	Instructions Hours per Week	Credits					
MEP4C1	L	T	P	L	T	P	Total
THEORY OF MACHINES	2	1	1	2	1	1	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the knowledge of basics of mechanisms(Gears, cams,etc), degrees of freedom.
- To give basic concepts of velocity and acceleration of mechanisms.
- To develop skill to analyze the behavior and applications of gear trains.
- To know the concept and effect of gyroscope.

Pre requisites: Engineering Mechanics, Engineering Physics, Engineering Mathematics.

COURSE CONTENTS

UNIT-I

Basics of Theory of Machines: Degree of Freedom (Grubler's criterion), Concept of mechanism, Inversions of Quadric cycle chain, single and double slider crank mechanism. Grashof's criterion, Types of kinematic synthesis, Synthesis of four bar function generator, Study of Straight line mechanisms(Paucellier, Tchebicheff's mechanisms), Steering Mechanisms (Ackerman's mechanism, Devi's Steering Gear mechanism). Hooke's joint and engine indicators.

UNIT-II

Velocity and Acceleration Analysis: Determination of velocity and acceleration by analytical and/or graphical methods of various mechanisms. , Study of Coriolis components, Klein's construction.

UNIT-III

Cams and Followers :Types of Cams and followers, Cam profiles with specified follower motion e.g. simple harmonic, constant velocity and acceleration and deceleration, cycloidal types, Cams with specified contours. Tangent Cams, Displacement, Velocity and Acceleration of followers.

UNIT-IV

Gears and Gear Trains :Types of gears, Terminologies of various gears (Spur. Bevel gear, Helical gear, Worm and Worm wheel), Condition for correct gearing, Basics of gear meshing, Tooth profiles (cycloidal and involute). Gear trains, Epicyclic gear trains and their analysis.

UNIT-V

Gyroscopes: Product of Inertia, Principle Axis, Gyroscopic Motion, Gyroscopic Torque, Gyrostabilizer, Gyrocompass. Application to Ships and Aero planes. Stability of Two & Four Wheelers.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Understand the concept of mechanisms and their applications
- Analyze the motion aspects of mechanisms.
- Understand the Gears and their uses.
- Learn basic fundamentals associated with Gyroscopic effect.

BOOKS RECOMMENDED:

1. Thomas,B., Theory of Machines, CBS Publications & Distributions,2000
2. Shigley, J.,Theory of Machines and mechanisms, Oxford University,2006.
3. Ambekar, A.G.,Mechanism and Machine Theory, Jain Brothers,2005
4. Singh Sadhu, Theory of Machines, Pearson's Education ,2006.
5. Rattan,S.S.,Theory of Machines, Tata McGraw Hill Education (P) Ltd.,2011

LIST OF PRACTICAL ASSIGNMENT

1. Study of cam and follower and finding velocity and acceleration of follower.
2. Study of slider crank mechanism.
3. Study of different kinematic pairs.
4. Generation of involute teeth profile for different gears.
5. Performance of interference and undercutting of tooth (by plotting).
6. Study of gyroscopic effect using gyroscope .
7. Reducing and enlarging drawings using pantograph ,study of straight line mechanisms.
8. Study of Double Hooks joint.
9. Study of Oldham's coupling .
10. Verification of Grashof's law.
11. Study of automobile steering gears.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP4C2	L	T	P	L	T	P	Total
MECHATRONICS	2	1	1	2	1	1	4

Learning Objectives:

- To provide an understanding of the mechatronic systems and their design process.
- To learn about the response and behavior of the devices that go into a mechatronic product, their interactions and overall behavior of the mechatronic system.
- To learn about the variety of sensors/transducers used in mechatronic applications and the processes used for the conditioning of signals.
- To learn about the methods used for the actuation and control of mechatronic systems.

Pre requisites: Basic course in electrical and electronic devices along with the concepts of digital electronics and a basic course in computer science and engineering.

COURSE CONTENTS

UNIT-I

Introduction to Mechatronics: Introduction to the field of mechatronics, Elements of a mechatronic system, Mechatronic design process, Applications in mechatronics. Introduction to signals & system: Block diagram approach to system modeling, Modeling of electrical, mechanical, translational and rotational, fluid and thermal systems, Measurement of system response, Linearization of non linear systems, Fourier series representation of signals, O/P response of first order and second order systems.

UNIT-II

Sensors & Transducers: Introduction of sensors and transducers, Performance characteristics of sensors and measurement systems, Sensors for motion & position measurement, Force torque & tactile sensors, Flow sensors, Temperature measuring devices, Ultra sonic sensors, Range sensors, Magnetostrictive transducers, Semiconductor, Fiber optic & Microelectromechanical system (MEMS) devices in mechatronics.

UNIT-III

Signal conditioning & recording of data: Basic steps of signal conditioning, Devices for signal conditioning & data conversion : Voltage divider & rectifiers , bridge circuits, Operational and instrumentation amplifiers, filters, comparators & oscillators multiplexers, timers, amplitude modulation & demodulation, voltage to frequency & frequency to voltage converters, pulse width modulation. Analog to digital conversion & digital to analog conversion.

UNIT-IV

Actuators: Introduction, Mechanical actuation systems , Electrical actuation systems: solenoids & relays, electric motors: DC motors , AC motors , Stepper motors, Servo motor drive circuits, selection of a motor, Fluid power actuators: Hydraulic and Pneumatic actuation systems, Piezoelectric actuators.

UNIT-V

Interfacing & control of mechatronic systems: Elements of a data acquisition & control system, Microprocessor and Microcontroller based systems, Overview of input / output systems: Interfacing, I/O addressing, Interface requirements, Peripheral interface adapters, Serial common interface, Input /Output card & software, open systems, Communication interfaces, Voltage regulators and power supplies, Introduction of various control systems, Control modes and control system performance.

Learning Outcomes:

Upon completing the course, student will able to:

- Acquire the basic knowledge for the application of the core technologies in the areas of mechanics, electronics and information processing to the solution of problems.
- Recognize the need for models of the systems in order to predict their behavior.
- Select and integrate the appropriate devices for the pickup, conditioning and display of signals related to the various processes involved in a mechatronic system..
- Select the suitable actuation and control system for a mechatronic application.

BOOKS RECOMMENDED

1. W.Bolton, *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 4th Ed*, Pearson Education.
2. Nitai Gour & P.Mahalik, *Mechatronics: Principles, concepts and applications*, Tata McGraw-Hill Publishing Company Ltd.
3. Alciatore David G. & Histan Michael B., *Introduction to mechatronics and measurement systems, 4th Ed* McGraw-Hill Publication.
4. Carryer J.Edward, Ohline R.Matthew, Kenny Thomas W., *Introduction to Mechatronic Design*, Pearson Education, Indian Edition 2013.
5. Ramachandran K.P., Vijayaraghavan G.K., Balasundaram M.S., *Mechatronics Integrated Mechanical Electronic Systems, Wiley India Pvt.Ltd.*
6. Narka and Choudhary, *Instrumentation, Measurement and analysis* Tata Mc Graw Hill Publishing Company Ltd.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP4C3	L	T	P	L	T	P	Total
FLUID MECHANICS	2	1	1	2	1	1	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make a fundamentally strong base to design fluid systems
- Understand the different fluid properties
- To develop skill to analyze fluid-flow patterns
- To become conversant with 'Fluid Dynamics, Fluid Kinematics in External and internal flows, Compressible flows.

Pre requisite(s) : Applied Mathematics I/II/III/IV, Applied Mechanics, Strength of Materials, Engineering Thermodynamics, Engineering Physics

COURSE CONTENTS

UNIT-I

Review of Fluid Mechanics: Introduction, Fluid Properties, Pressure and its measurement, Hydrostatic forces on submerged surfaces, Buoyancy and Stability. Relative Equilibrium. Fluid Kinematics: Lagrangian and Eulerian Approaches, Fundamentals of Flow visualization, Potential flow, Stream function and Velocity Potential function, Vorticity, Rotationality and Circulation, Flow Nets, Reynold's Transport Theorem.

UNIT-II

Fluid Dynamics: Introduction, Conservation of mass, Mechanical energy and efficiency, Bernoulli's equation, Applications of Bernoulli's equation, Correction factors, Newton' Law and Conservation of momentum, Linear Momentum equation, Angular Momentum equation. Introduction to boundary layer, Laminar and Turbulent boundary layers, Boundary Layer Thickness, Reynold's, Number, Boundary Layer Separation.

UNIT-III

Flow over Bodies: Introduction, Navier-Stokes Equations, Drag and Lift, Friction and Pressure Drag, Drag Coefficients of common geometries, Parallel Flow over Flat Plates, Flow over Cylinders and Spheres, Aerofoils, Lift, Von-Karmon Vortex Street, Kutta-Joukowski Equation.

UNIT-IV

Flow Trough Conduits: Flow through Pipes: Introduction to Laminar and Turbulent Flows, Entrance region, Fully Developed flow, Laminar Flow in pipes, Turbulent flow in pipes, Losses in Pipe flow, Hagen-Poiseuille's Equation, Darcy's Weisbach Equation, Moody's Chart, Piping Networks.

Open Channel flow: Classification, Froude' Number and Wave Speed, Specific energy, Continuity and Energy equations, Uniform flow and Gradually Varied flow.

UNIT-V

Compressible Flow: Stagnation Properties, Speed of Sound and Mach Number, One-Dimensional Isentropic Flow, Isentropic Flow Through Nozzles, Shock Waves and Expansion Waves, Rayleigh and Fanno Flows. Introduction to Computational Fluid Dynamics (CFD) System.

Learning Outcomes:

Upon Completing the Course, Student will able to

- Well established concepts of the theory of fluid mechanics
- Develop bases of analyses in fluid mechanics
- Understand the fundamental mechanics involved in different fluid flow cases in applications
- Develop a base for Computational Fluid Dynamics (CFD)

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BOOKS RECOMMENDED:

1. Douglas John F., *Fluid Mechanics*, Pearson Education, 2005.
2. Centgel Y. A., *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill Co, 2003.
3. Streeter V. L and Wylie E. B., *Fluid Mechanics*, McGraw-Hill Co, 2003.
4. White F., *Fundamentals of Fluid Mechanics*, McGraw-Hill Co, 2003.
5. Fox R.W., McDonald A T., Pritchard P. J., Mitchell J. W., *Fluid Mechanics*, 9ed 2015

LIST OF PRACTICAL ASSIGNMENT

1. To verify Bernoulli's Theorem.
2. Calibration of Venturimeter and Orifice-meter.
3. To find the Friction Coefficient of different pipes.
4. Determination of different coefficients of the orifice
5. Calibration of external cylindrical mouth pieces of different diameters/ Different L/D ratios
6. Calibration of internal cylindrical or Borda's mouth piece.
7. To Visualize the Forced/ Free Vortex Phenomenon.
8. To determine loss of head in the fittings at various water flow rates.
9. To Plot velocity potential and stream functions.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MEP4G1 APPLIED THERMODYNAMICS	2	1	0	2	1	0	3
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The basic objectives of the subject are:

- To understand fundamentals of thermal systems and their processes.
- To understand the engineering applications of thermodynamics

Prerequisite(s): Engineering Physics and Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT- I

Second Law of Thermodynamics: Cyclic Heat Engine, Kelvin Planck Statement, Claussius Statement, Equivalence of Kelvin Planck and Claussius Statements, Reversibility and Irreversibility, Carnot Cycle, Carnot's Theorem, Absolute Thermodynamic Temperature Scale, Efficiency of the Reversible Heat Engine, Illustrative Problems .

UNIT- II

Entropy: Introduction, Claussius Theorem, Property of Entropy, Inequality of Claussius, Entropy change in an Irreversible Processes, Entropy Principle, Applications of Entropy Principle, Entropy Transfer with Heat Flow, Entropy and Disorder, Absolute Entropy Illustrative Problems .

UNIT- III

Fuels and Combustion: Introduction, Classifications of fuels, Combustion Equations, Theoretical Air and Excess Air, Stoichiometric Air-Fuel Ratio, Weight of Carbon in Flue Gases, Weight of Flue Gases per kg of Fuel Burnt, Analysis of Exhaust and Flue Gases .

UNIT-IV

Thermodynamic Relations: Mathematical Theorems, Maxwell's Equations, TdS Equations, Difference in Heat Capacities, Ratio of Heat Capacities, Energy Equation, Joule-Kelvin Effect, Illustrative Problems.

UNIT- V

Gas Compressors: Compression Processes, Work of Compression, Single Stage Reciprocating Air Compressor, Volumetric Efficiency, Multi Stage Compression, Illustrative Problems .

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
- To understand the basic concepts of heat transfer and work transfer involved in the process.
- Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

BOOKS RECOMMENDED :

1. Yunus A Cengel ,*Thermodynamics-An Engineering Approach*, Tata Mc-Graw Hill Publishing House, New Delhi, V Edition.
2. Sonntag R E, Van Wylen G J, Borgnakke C, *Fundamentals of Thermodynamics*, John Wiley & Sons Pte Limited , Singapore, V Edition.

**M.E FULL TIME PROGRAM
SCHEME&SYLLABUS
IVth semester**

Computer Engineering

SEM IV			L-T-P	
1	SER4D2	Dissertation Phase II	0-0-12	
2	SER4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	

**M.E FULL TIME PROGRAM
SCHEME&SYLLABUS
IVth semester**

Information Technology

SEM IV	ISR3D2	Dissertation Phase II	0-0-12	
	ISR4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	

**M.E FULL TIME PROGRAM
SCHEME&SYLLABUS
IVth semester**

Digital Instrumentation

SEM IV	DIR4D2	Dissertation Phase II	0-0-12	
	DIR4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	

**M.E FULL TIME PROGRAM
SCHEME&SYLLABUS
IVth semester**

Digital Communication

SEM IV		L-T-P
DCR4D2	Dissertation Phase II	0-0-12
DCR4V4	Comprehensive Viva IV	0-0-4
Total Credit for SEM IV		12 actual + 4 Virtual credits

**M.E FULL TIME PROGRAM
SCHEME&SYLLABUS
IVth semester**

Industrial Engineering & Management

IMR4D2	Dissertation Phase II	0-0-12=12
IMR4V4	Comprehensive Viva IV	0-0-4=4
Total Credit for SEM IV		12 actual + 4 Virtual credits

**M.E FULL TIME PROGRAM
SCHEME&SYLLABUS
IVth semester**

Design & Thermal

DTR4D2	Dissertation Phase II	0-0-12=12
DTR4V4	Comprehensive Viva IV	0-0-4=4
12 actual + 4 Virtual credits		

M.E PART TIME PROGRAM SCHEME&SYLLABUS

COMPUTER ENGINEERING II YEAR IV SEMESTER

SEM IV	Sub Code	Sub Name	L-T-P	Sub-Type
1.	SEP4C6	Software Testing and Quality Assurance	3-1-1	PC6
2.	SEP4Ex	Elective II	3-1-1	PE2
3.	SEP4W2	Seminar/ Res. Tool/Research Tool	0-2-0	
4.	ASP4S2	Soft Skills -2	2-0-0	
5.	SEP4V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	

List Of Electives

2	SEP4E4	Speech And Language Processing	3-1-1	PE
2	SEP4E5	Aspect Oriented Software Engineering	3-1-1	PE
2	SEP4E6	Machine Learning	3-1-1	PE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering)(Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP4C6 Software Testing & QA	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop a skill in developing good quality in the software product.

Pre requisites: Basic knowledge of software Engineering and programming.

COURSE CONTENTS

UNIT-I

SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics – Various software development Life cycles (SDLC) –Principles of testing.

UNIT-II

WHITE BOX TESTING White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis

UNIT-III

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing- Integration Testing

UNIT-IV

TESTING STRATEGIES: System testing - Functional testing-non-Functional testing-acceptance testing-performance testing –Factors and Methodology for Performance testing, Regression testing- Methodology for Regression-testing.

UNIT-VADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING): Syntaxtesting - Finite state testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-

based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

Learning Outcomes:

- To learn to Software Testing & QA concepts and its approaches to software Testing and QA.

BOOKS RECOMMENDED:

1. Srinivasan Desikan&Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education, 2006.. Patton; Software Testing; Techmedia (SAMS) 2000.
2. GlenfordJ.Myers, " The Art of Software Testing ", John Wiley & Sons, 1979.
3. Boris Beizer, Black-Box Testing: “Techniques for Functional Testing of Software and Systems ", John Wiley & Sons, 1995.
4. P.C.Jorgensen, “Software Testing - A Craftsman’s Approach ", CRC Press, 1995.

Devi Ahilya University, Indore Institute of Engineering & technology			II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SEP4E4 Speech and Language Processing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective:

- To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Prerequisite: Discrete structures, Finite automata, information retrieval and Context-free Grammar

COURSE CONTENTS

UNIT I

Natural Language Processing, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNIT II

Computational Phonology: speech sound, phonetic transcription, text to speech; Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-grams.

UNIT III

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNIT IV

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, WordNet.

UNIT V

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

TEXTBOOKS:

1. D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.
2. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",
3. James Allen. "Natural Language Understanding", Addison Wesley, 1994.

Learning Outcomes:

1. Will able to solve Problem based on Stemming Algorithm.
2. Will able to solve Problem based on Part of Tagging.
3. Will able to solve Problem based on Parsing.
4. Will able to solve Problem based on Information Retrieval.
5. Will able to solve Case study on Different NLP Techniques
6. Can build Cricket Game Prediction application
7. Will able to solve Machine Translation from English-Hindi.
8. Will able to solve Query Expansion for Information Retrieval.
9. Will able to solve Emotion detection for texts.
10. Will able to solve Any other problem based on emerging trends in speech & language processing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP4E6	L	T	P	L	T	P	Total
Machine Learning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information.
- The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III

Unsupervised Learning: Introduction to unsupervised learning -Clustering -Classification of clustering algorithms: K-Means and EM -Factor Analysis: PCA (Principal Components Analysis) and ICA (Independent Component Analysis) -Self-Organized Maps (SOM) and Multi-dimensional Scaling.

Unit-IV

Computational Learning theory, Introduction, PAC Learning, VC dimension, Support Vector Machines (SVM), Genetic Algorithm (GA), illustrative examples for SVM and GA.

Unit-V

Artificial Neural Networks Learning, Introduction, Neural Network Representation, Perceptron, Backpropagation algorithm, Examples of Neural Network Learning.

Learning Outcomes:

- Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

RECOMMENDED BOOKS

1. Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
2. Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
3. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
4. David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
5. Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

List of Assignment in Machine Learning Lab:

1. Problem based on different machine Learning algorithm
2. Works on different machine learning Tools
3. Case Study on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP4E5 Aspect Oriented Software Engineering	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- The objective of this course is to master basics of aspect-oriented software development, which enables a higher degree of the separation of concerns through crosscutting concern modularization.
- The course provides an overview of aspect-oriented approaches to software development throughout all of its stages, as well as programming languages connected with these approaches.
- The course also covers the relationship of aspect-oriented software development and software product lines. Students will gain experience with Aspects, which is the most important aspect-oriented programming language of today.

Pre-requisite:

Familiarity with Object oriented programming, Object oriented design, UML is essential.

COURSE CONTENTS

Unit 1: Introduction to AOSD

This module provides a broad overview of aspect orientation. It introduces students to the aspect-oriented paradigm's origins and foundations, providing a solid basis and a common terminology to be used in subsequent modules. The fundamental concepts include all major elements of the paradigm: separation of concerns, crosscutting concerns, modularization, aspects, join points, point cuts, advice, and aspectual composition. Module 1's only prerequisite is knowledge of software engineering in some existing, well known paradigm.

Unit 2: Aspect-oriented analysis and design

This module covers a broad spectrum of software development activities, from initial requirements definition to architecture derivation and detailed design production. Each of these life-cycle stages can be realized using various aspect-oriented approaches. This module underlines the problems of tangling and scattering caused by crosscutting concerns in non aspect-oriented analysis and design approaches. It also presents aspect-oriented approaches for aspect identification, modularization, and composition, using several case studies for illustration. An in-depth experience with a particular analysis and design technique and its related tools is a final important goal of the module. Students achieve hands-on experience of aspect-oriented analysis and design through exercises. The prerequisites are Module 1 and

familiarity with some requirements engineering, architecture, and design approaches. Knowledge of object-oriented (OO) analysis and design techniques (including UML) is desirable.

Unit 3: Aspect-oriented programming

Several AOP languages exist today, and most are extensions of existing languages. This module focuses on hands-on experience, giving special care to programming practices in AOP. The module covers various aspect languages, highlighting their differences and commonalities to teach students to abstract from concrete languages and understand aspect orientation's essential mechanisms. It also touches on implementing aspect language execution models to help students better understand the impact of aspects on program execution (for example, in terms of performance). The prerequisites are Module 1 and experience in or knowledge about software implementation by means of contemporary languages, preferably in the OO paradigm.

Unit 4: Formal foundations of AOSD

This module extends or reevaluates formal notions, such as semantics, specification, and verification, in an aspect-oriented context. It surveys several semantic approaches, concentrating on one or two of them. It also covers specification of aspects, so that analysis of their desired properties becomes possible. The module presents formal methods for verifying and refining aspect systems, extending classical model checking to aspects, and relating static analysis to classes of temporal properties. The module uses these formal approaches to

1. define and compare declaring and weaving aspects,
2. specify the properties an aspect adds and determine whether these are true when the aspect is woven to a system, and
3. show that composing an aspect doesn't disturb the system's desirable properties.

The module also surveys existing work and defining and analyzing interactions among multiple aspects. The prerequisites include Module 1 and notions of computer science's formal foundations, especially logic and automata theory. Some instantiations might also require Module 3.

Unit 5: Aspect-oriented applications

Module 5 illustrates the practical use of various aspect-oriented technologies, such as programming languages, aspect-oriented analysis and design, and more generally, any software engineering methodology that embraces aspects. It presents case studies of applications that benefit from AOSD, covering system level elements (such as middleware) and end-to-end user applications (such as e-banking or e-government applications). The module's main subject isn't technologies that create system-level elements and end-to-end user applications; Modules 2 and 3 will have covered these. The prerequisites are Module 1 and, depending on the instantiation, Module 2 and/or Module 3.

Unit 6: AOSD and other paradigms

Aspects are always used in a context. Therefore, to develop applications using aspect-oriented techniques, it's important to relate AOSD to the development paradigms, methodologies, and programming languages that you used to implement the underlying base application. AOSD's context is almost always class-based object orientation. However, as AOSD spreads to other

contexts, this relationship will diversify and become more important. Also, other advanced development paradigms have been developed that can be related to AOSD, either because they're complementary or because they target the same problems as AOSD (albeit differently). This module provides insights into the relationship between AOSD and these other advanced development paradigms (for example, development methodologies other than the OO paradigm), different general-purpose programming languages for the base code, and component-oriented software engineering. The prerequisites are Module 1 and at least one other module.

Text Books:

1. Ivar Jacobson and Pan-Wei Ng. Aspect-Oriented Software Development with Use Cases. Addison-Wesley, 2004.
2. RamnivasLaddad. AspectJ in Action: Enterprise AOP with Spring Applications. Second edition, Manning, 2009.
3. Mastering AspectJ: Aspect-Oriented Programming in JavaBy Joseph D. Gradecki, Nicholas Lesiecki, Wiley 2003

Reference Books:

1. Robert E. Filman et al. Aspect-Oriented Software Development. Addison-Wesley, 2004.
2. Siobhan Clarke and Elisa Baniassad. Aspect-Oriented Analysis and Design: The Theme Approach. Addison-Wesley, 2005.
3. Aspect-oriented Programming with AspectJ. Ivan Kiselev, Sams, 2003

Learning Outcomes:

- The students after completion of the course shall be having the knowledge of aspect-oriented software development, which enables a higher degree of the separation of concerns through crosscutting concern modularization.
- Students will be able to build solutions with AspectJ on completion of the course.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Sp. in Software Engineering) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits		
ASP4S2: Soft Skill-2	L	T	P			Total
	2	-	-			2
Duration of Theory Paper:3 Hours						

Objective:

- To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics Groups – Definition & Meaning , Stages & Process of Group Formation, types,**Work Group Behaviour** – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

BOOKS RECOMMENDED:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
2. R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
3. Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
4. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

**INFORMATION TECHNOLOGY
II YEAR
IV SEMESTER**

SEM IV			L-T-P	Sub-Type
1.	ISP4C1	Secure Wireless Networks	3-1-1	PC6
2.	ISP4Ex	Elective II	3-1-1	PE2
3.	ISP4W2	Seminar/ Workshop-II	0-2-0	
4.	ISP4V4	Comprehensive Viva IV	0-0-2	
5.	ASP4S2	Soft Skills-2	2-0-0	

List of Electives

2	ISP4E1	Biometric Systems & Security	3-1-1	PE
2	ISP4E2	Secure Software Engineering	3-1-1	PE
2	ISP4E3	Trust management in E- Commerce	3-1-1	PE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP4C1: Secure Wireless Networks	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

- Provide students with enhance base of knowledge of wireless networking.
- Learn Security Issues in different wireless networks and mitigation techniques
- Develop a comprehensive knowledge of Tools and Techniques used in Management of wireless Networks
- Develop ability to carry out research in area of security in wireless Networks

COURSE CONTENT

Unit I : Foundation

Review of wireless communication Technologies : Cellular Networks, Wireless LAN, Personal Area Networks, Adhoc and Sensor Networks, Challenges in Adhoc and Sensor networks: Constrained Resources, Security, Mobility

Unit II :

Adaptability in Mobile computing, Mobility Management: Location Management Principles and Techniques, Data Dissemination and Management.

Unit III : Mobile and Wireless Security Issues, Approaches to security, Security in Wireless Personal Area Networks: Bluetooth Security Modes, Bluetooth Security Mechanisms, Authentication and Encryption in Bluetooth networks.

Unit IV :

Security in Wireless Local Area Networks: WEP, WPA, IEEE802.11i, Security in Metropolitan Area Networks: IEEE 802.16 and Security.

Unit V :

Security in Wide Area Networks: GSM Security, Four Generations of Wireless: 1G-4G, limitations and Security. Security in Ad hoc and Sensor networks.

Course outcomes:

After the completion of course student will be able to:

- Have enhanced base of knowledge of wireless networking.
- Learn Security Issues in different wireless networks and mitigation techniques
- Develop a comprehensive knowledge of Tools and Techniques used in Management of wireless Networks

Text and Reference books:

1. Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, S.K. Gupta, G. Richard
2. III, L. Schwiebert, Mc Graw Hill, Ed.2005.
3. Hacking Exposed : Mobile Secrets & Solutions, N.Bergman, M.Stanfield, J.Rose, J. Scambray.
4. Building Secure Wireless Networks with 802.11, Jahanzeb Khan and Anis Khwaja, Wiley 2003.

- Develop ability to carry out research in area of security in wireless Networks

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP4E1: Biometric Systems & Security	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

- To study the concepts of various biological based information security systems.

COURSE CONTENT

Unit I : Overview of Biometrics

Definitions, biometric modalities, course outline, Basic applications: access control, e-commerce, forensics.

Unit II : Design of a Biometric System

Building blocks, Modes of operation, Fingerprint verification: Minutiae Based Fingerprint Matching, Non-minutiae Based Representations, Fingerprint Enhancement, and Fingerprint Classification. Face Recognition:- Introduction, Authentication vs. Identification, Challenges in Face recognition, Algorithms for face recognitions.

Unit III : Iris Recognition

Introduction, devices for capturing Iris, Iris representation schemes, Iris recognition algorithms. Biometrics based on hand geometry, signature, ear, palm, voice and DNA.

Unit IV : Multimodal Biometrics

Limitations of unimodal systems, multibiometric scenarios, levels of fusion, system design, score fusion techniques, score normalization, user-specific parameters, and soft biometrics.

Unit V : Case Study Presentations

Biometrics in Banking Industry, Biometrics in Computerized, Patient Records, Biometrics in Credit Cards, Biometrics in Mass Disaster Victim, Identification Forensic Odontology

Course outcomes:

After the completion of course student will be able to:

- Will learn the concept of biometric methods.
- Will merge the software application with human body features
- Will learn the concept of retina and figure prints association with biometric devices

Text and Reference books:

1. D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar; “Handbook of Fingerprint Recognition”; Springer Verlag, 2003.
2. A.K. Jain, R. Bolle, S. Pankanti (Eds.); “BIOMETRICS: Personal Identification in Networked Society”, Kluwer Academic Publishers, 1999.
3. J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.); Biometric Systems: Technology, “Design and Performance Evaluation”; Springer, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP3G2: Applied Cryptography	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

- To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Modular Arithmetic and Multiplicative Group

Modular Arithmetic for advanced cryptography, Multiplicative group of integers \mathbb{Z}_n , order of an element in \mathbb{Z}_n , generator of \mathbb{Z}_n , extended Euclidean algorithm, Pohlig-Hellman and Pollard-Rho algorithm for computing DLP, Integer factorization problems, Pollard-Rho factoring algorithm.

Unit II : Tools for Symmetric key & Public key Cryptography

Shannon ciphers and perfect security, computational ciphers and semantic security, efficient adversaries and attack games, trapdoor function schemes, trapdoor function pair schemes, ElGamal cryptographic system, ElGamal digital signatures, fun applications.

Unit III : Block Ciphers and Their Attacks

Polynomial arithmetic, finite field $GF(2^n)$, constructing block cipher in practice, sophisticated attacks on block ciphers, case study block cipher AES: AES structure, AES transformation functions, AES key expansions, AES Implementation, fun applications.

Unit IV : Cryptanalysis, IDS and Attacks

Intrusion detection system (IDS), cross site scripting attacks, SQL injection attacks, fault injection attacks, side channel attacks, algorithmic attacks.

Unit V : Asymmetric Key Cryptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.

Course outcomes:

After the completion of course student will be able to:

1. Understand the various security algorithm.
2. Encryption and decryption algorithm

Text and Reference books:

1. Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC
2. Williams Stallings; "Cryptography & Network Security"; Pearson Education.
3. Mathew Bishop; Introduction to computer Security; Addison-Wisley
4. Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME–IYear(Spl information technology) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P				Total
ASP4S2:Soft Skill-2	2	-	-				2
	Duration of Theory Paper:3 Hours						

Objective:

- To learn about basic Life and Organizational skills.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

BOOKS RECOMMENDED:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
2. R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
3. Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
4. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

**DIGITAL INSTRUMENTATION
II YEAR
IV SEMESTER**

S.no	Sub Code	Sub Name	L-T-P	Sub- Type
1.	DIP4C3	System Design Using Verilog	3-1-1	PC6
2.	DIP4EX	Elective II	3-1-1	PE2
3.	ASP4S2	Soft Skill 2	2-0-0	
4.	DIP4W2	Seminar / Workshop / Research Tool	0-2-0	
5.	DIP4V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	

List Of Electives

2	DIP4E1	Analog and Digital VLSI Circuit Design	3-1-1	PE
2	DIP4E2	Analytical Instrumentation	3-1-1	PE
2	DIP4E3	Optical and Laser Instrumentation	3-1-1	PE
2	DIP4E4	Advanced Industrial Drives and Control	3-1-1	PE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP4C3: System Design using Verilog	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives:

- To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog. Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s):Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

Unit I

Overview of Digital Design with Verilog HDL: Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts: Lexical conventions, data types, system tasks, compiler directives.

Unit II

Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling: Modeling using basic Verilog gate primitives, description of andlor and buflnottype gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling: Continuous assignments, delay specification, expressions, operators, operands, operator types.

Unit III

Behavioral Modeling: Structured procedures, initial and always,blocking'and nonblocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation.

Useful Modeling Techniques: Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

Unit IV

Timing and Delays: Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling: MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

Unit-V

Logic Synthesis with Verilog HDL: Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

Course Outcomes:

After the completion of course student will be able to:

- More understanding of Evolution of CAD will be developed which will make the development process

of the models easy.

- Power consumption can be optimized by learning the concept of MOS and CMOS switches, bidirectional switches etc.

Text Books and References:

1. Samir Palnitkar , “Verilog HDL-A guige to Digital Design and Synthesis “ 2nd Edition, Pearson , 2006.
2. J. Bhaskar, “A Verilog HDL Primer”, B.S Publications,
3. Douglas J. Smith, “Hdl Chip Design : A Practical Guide for Designing, Synthesizing & Simulating ASICs &FPGAs Using VHDL or Verilog”.Doone Pubns ,1998.
4. Blaine Readler , “Verilog by Example: A Concise Introduction for FPGA Design”, Full Arc Press, 2011

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP4E1: Analog and Digital VLSI Circuit Design	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives:

- This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT II

MOS Transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on delay and power dissipation.

UNIT IV

CMOS Circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation

Course Outcomes:

After the completion of course student will be able to:

- Fundamental of CMOS VLSI design with different VLSI design methodologies.
- Research work based on sequential and semiconductor memory circuit design.
- Different limitations of CMOS in NANO technology will be studied for better refinement

Text and Reference Books:

1. Sung-mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuit analysis and Design, 3rd

Edition, Tata McGraw-Hill.

- Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, 2nd Edition, PHI, (anded), AW/Pearson, 2001.
- CMOS mixed-signal circuit design by R. Jacob Baker Wiley India, IEEE press, reprint 2008.
- Design of analog CMOS integrated circuits by Behad Razavi McGraw-Hill, 2003.

List of Experiment:

Note : Use the BSIM3v3 (T-SPICE Level 49) model to characterize a 0.18 μ m CMOS process (TSMC).

- Determine the threshold voltage V_{TH} , for the NMOS and PMOS devices (for $V_{BS}=0$, $L=0.18\mu\text{m}$ and $W=1\mu\text{m}$), by extrapolating from the I_D-V_{GS} curve at low V_{DS} . Explain your circuit setup. How does this result compare to values reported in the model file? Also, determine the body-effect parameter.
- Determine the subthreshold slope factor S for the NMOS and PMOS devices (at $V_{DS}=1.8\text{V}$, room temperature). Determine the leakage currents at $V_{GS}=0\text{V}$. Repeat it at a lower temperature $T=77\text{k}$.
- Determine the effects of channel length L on the threshold voltage V_{Th} between $0.18\mu\text{m}$ to $2.0\mu\text{m}$. Draw V_{Th} of the NMOS and PMOS as a function of L (for $V_{DS}=1.8$ and 1.2V).
- Determine the effects of drain-source voltage V_{DS} , on the threshold voltage V_{Th} between and 1.8V . Draw V_{Th} as a function of V_{DS} (for $L=0.18\mu\text{m}$). What is the measured DIBL factor?
- With the given CMOS inverter Circuit calculate and estimate the static Characteristics Determine the VTC of CMOS Inverter Obtain the NM_H , NM_L , and V_M for the inverter Dynamic Characteristics Measure the t_{pHL} , t_{pLH} , t_p , t_r , t_f
- Power Consumption with varying load capacitances from 100fF to 500fF . And compute the power Delay Product (PDP) for the 0.18 Micron technologies.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIP4E2: Analytical Instrumentation	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

- This course exposes the students to various instruments and techniques used in the analysis and identification of elements and compounds

Prerequisite: Knowledge of basic Electronics and Fundamentals of Chemistry

COURSE CONTENTS

Unit I

Colorimeters, Visible-Ultraviolet Spectrometers (single beam, Direct reading), **Infrared Spectrometers:** Basic components, Types of IR spectroscopy, **Atomic Absorption Spectrometers:** Flame photometer (principal and constructional details), principle of AAS, radiation sources, Burners and Flames, Plasma Excitation sources.

Unit II

Fluorimeters: Principle of Fluorescence, Measurement of fluorescence, Phosphorimeters, **Raman Spectrometer:** The Raman effect, Source, sample chamber, spectrometer and detector, Photo Acoustic, Photo thermal Spectrometers **Mass Spectrometers:** Principle of operation, Types of MS, Components of MS, ICP- MS

Unit III

Nuclear Magnetic Resonance Spectrometers: Principle of NMR, Types of NMR, Constructional details of NMR, **Electron Spin Resonance Spectrometers:** Basis ESR spectrometer and constructional details, Electron and Ion Spectroscopy, Basic X-ray Spectrometers

Unit IV

Gas Chromatographs, Liquid Chromatography, Thermo Analytical Methods

Unit V

PH Meters, Blood Gas Analyzer, Industrial Gas Analyzers, Environmental Pollution Monitoring Instruments

Course Outcomes:

After the completion of course student will be able to:

- Develop algorithms and tools based on the research work for various industry.
- Enhance research oriented work.

Text and Reference Books:

1. H. H. Williard, L. L. Merrit, J. A. Dean, and F. A. Settle, Instrumental Methods of Analysis, 7/e, CBS Publishers and Distributors, India, 1988
2. D. A. Skoog, F. J. Holler, and T. A. Nieman, Principles of Instrumental Analysis, 6/e., Thomson Learning, 1998
3. R. S. Khandpur, Handbook of Analytical Instruments, Tata McGraw Hill, New Delhi
4. R. K. Jain, Mechanical and Industrial Measurements, Khanna Publishers, Delhi, 1985

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP4E3: Optical and Laser Instrumentation	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

- This course exposes the students to various instruments and techniques used in the

CONTENTS

Unit I

Laser Fundamentals: coherence; Spatial and Temporal, Laser theory; absorption, Spontaneous and Stimulated emission, Population inversion, pumping, Einstein coefficient, Resonators, mirrors and modes, Laser output, Q switching, modulation of output by different techniques.

Unit II

Laser Systems & Instrumentation: Principle and construction of different Laser sources-solid state, gas, He-Ne Gas laser, Ruby Laser, CO₂ laser, semiconductor and free electron lasers. Tunable lasers etc., Lengths, displacement and shape measurement; laser heterodyne, Laser Doppler and particle image velocimetry

Unit III

Laser applications: LIDARs (Light Detection And Ranging), Laser alignment, gauging inspection and Laser machine vision, laser material processing, Laser applications to chemical and environmental Analysis, Laser- induced fluorescence, Temperature measurement techniques, Laser Tweezers: Single- dual-and multiple-beam tweezers, and applications.

Unit IV

Holography and Speckle based NDT: Principle of Holography, Holographic Interferometry; Double exposure, Time averaged, Real time H.I., Laser speckle techniques; speckle photography/ interferometry, and digital speckle pattern interferometry and applications of laser speckles, Lengths, displacement, Velocity, slope and shape measurement etc., Optical coherence tomography: biomedical applications.

Unit V

Fiber Optic Sensors: Basics of Optical fiber as sensing device, classification of fiber sensors, intensity, phase, frequency, wavelength modulated sensors, measurement of temperature, pressure, liquid level, displacement, flow, electric and magnetic fields.

Course Outcomes:

After the completion of course student will be able to:

- Develop algorithms and tools based on the research work for biomedical applications development.
- Enhance research oriented work based on Holography and Speckle based NDT.

Books Recommended:

- Optical Electronics : Ghatak & Thygarajan, Cambridge University Press
- Basics of Holography : P. Hariharan, Cambridge University Press
- Optical Metrology: Kjell J. Gåsvik, John Wiley & Sons, Ltd, 2013
- Optics: Eugene Hecht, Pearson Education Ltd., 2014
- Fiber Optic Sensors, Second Edition, Shizhuo Yin, Paul B. Ruffin, Francis T.S. Yu, CRC Press, 2008

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credit s			
DIP4E4: Advanced Industrial Drives and Control	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective:

- To study the different motors used in industry and their driving circuits.

COURSE CONTENTS

Unit I

Introduction to Power Devices: Construction, Working, Characteristics, Specifications and applications of SCR, TRIAC, DIAC, Power MOSFET, IGBT and UJT. SCR gate triggering and commutation circuits. Series and parallel connection of SCR and its triggering arrangement. Choppers: Principle, Working, Classification, Thyristorised Choppers- Jones Chopper, Morgan Chopper, Single Phase and Three Phase Controlled rectifiers, (Half wave, full wave and bridge configuration with resistive and Inductive Load. Inverters and choppers, Single- phase rectifiers and single phase controlled Inverters: Classification, Single Phase half bridge and full bridge Inverters, PWM Inverters

Unit II

Motors Fundamentals and Mechanical Systems: DC motor - Types, induced emf, speed-torque relations; Speed control – Armature and field control; Ward Leonard control – Constant torque and constant horse power operations. Review of Induction Motor operation – Equivalent circuit – Performance of the machine with variable voltage, rotor resistance variation, pole changing and cascaded induction machines, slip power recovery – Static Kramer Drive. Synchronous, Brush less DC and Switched Reluctance Drives

Unit III

Converter and Chopper Control: Principle of phase control – Series and separately excited DC motor with single phase and three phase converters – waveforms, performance parameters, performance characteristics - Operation with free wheeling diode schemes; Drive employing dual converter. Introduction to time ratio control and frequency modulation; Class A, B, C, D and E chopper controlled DC motor – performance analysis, multi- quadrant control.

Unit IV

VSI and CSI Fed Induction Motor Control: AC voltage controller fed induction machine operation – Energy conservation issues – V/f operation theory – requirement for slip and stator voltage compensation. CSI fed induction machine – Operation and characteristics - PWM controls. Field oriented control of induction machines – Theory – DC drive analogy – Direct or Feed back vector control - Indirect or Feed forward vector control – Flux vector estimation - Space Vector Modulation control, Direct torque control of Induction Machines – Torque expression with stator and rotor fluxes, DTC control strategy – optimum switching vector selection – reduction of torque ripple methods

Unit V

Special purpose Machines and control: Stepper motor: Working principle, construction, types, application and characteristics. Half and full step sequence, driving circuit using L297, L298 Servo

motor: Working principle, construction, types, application and characteristics, Universal Motor: Working principle, construction, types, application and characteristics

Course Outcomes:

After the completion of course student will be able to:

- Different technology for Chopper, Morgan Chopper ,Single Phase and Three Phase Controlled rectifiers etc.

Text and Reference Books:

1. Gopal K Dubey, “Power Semiconductor controlled Drives”, Prentice Hall Inc., New Jersey, 1989.
2. Bimal K Bose, “Modern Power Electronics and AC Drives”, Pearson Education Asia 2002.
3. Vedam Subramanyam, “Electric Drives – Concepts and Applications”, Tata McGraw Hill, 2000.
4. R.Krishnan, “Electric Motor Drives – Modeling, Analysis and Control”, Prentice- Hall of India Pvt. Ltd., New Delhi, 2003.
5. Austin Hughes, “Electric Motors and Drives – Fundamentals, Types and Applications”, Elsevier – a division of Reed Elsevier India private Limited, New Delhi, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl. digital instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP4S2: Soft Skill-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective:

- To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and

Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

BOOKS RECOMMENDED:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
2. R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
3. Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
4. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

M.E(Digital Communication) IVth semester

S.no	Sub-Code	Sub-Name	L-T-P	Sub-Type
1.	DCP4C3	System Design Using Verilog	3-1-1	PC6
2.	DCP4Ex	Elective II	3-1-1	PE2
3.	DCP4W2	Seminar/ Res. Tool/Research Tool	0-2-0	
4.	ASP4S2	Soft Skills -2	2-0-0	
5.	DCP3V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	

List Of Electives

2	DCP4E1	Analog and Digital CMOS Circuit Design	3-1-1	PE
2	DCP4E2	Network Security	3-1-1	PE
2	DCP4E3	Mobile Computing	3-1-1	PE
2	DCP4E4	Software testing and Quality assurance	3-1-1	PE

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Digital Communication) Part Time Semester- B				
Subject Code & Name	Instructions Hours per Week			Credits			
DCP4C3 System Design Using Verilog	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives:

- To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog .Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s): Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

UNIT –I

Overview of Digital Design with Verilog HDL -Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts -Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts -Lexical conventions, data types, system tasks, compiler directives.

UNIT -II

Modules and Ports-Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling -Modeling using basic Verilog gate primitives, description of andlor and buflnot type gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling -Continuous assignments, delay specification, expressions, operators,operands, operator types.

UNIT -III

Behavioral Modeling -Structured procedures, initial and always, blocking'and nonblocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation.

Useful Modeling Techniques -Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

UNIT -IV

Timing and Delays -Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling- MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

UNIT -V

Logic Synthesis with Verilog HDL-Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

Course Outcomes:

After the completion of course student will be able to

- Able translate a functional system description into appropriate digital blocks coded in Verilog
- Can solve practical application based on synthesis, place, and route of a digital design into a target FPGA.

BOOKS RECOMMENDED

1. Samir Palnitkar , “*Verilog HDL-A guige to Digital Design and Synthesis* “ 2nd Edition, Pearson , 2006.
2. J. Bhaskar, “*A Verilog HDL Primer*”, B.S Publications,
3. Douglas J. Smith, “*Hdl Chip Design : A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog*”.Doone Pubns ,1998.
4. Blaine Readler , “*Verilog by Example: A Concise Introduction for FPGA Design*”, Full Arc Press, 2011

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP4E1 Analog and Digital VLSI Circuit Design	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives:

- This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design.
- It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT -I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT -II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT -III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT -IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit –V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation.

Course Outcomes:

After the completion of course student will be able to

- Will learn the the fundamental of CMOS VLSI design.
- Apply different VLSI design methodologies .
- Learn to design combinational, sequential and semiconductor memory circuit .
- Learn about the limitations of CMOS in NANO technology with introduction to the NANO Technology.

BOOKS RECOMMENDED

1. Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
2. [Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, 2nd Edition, PHI, anded), AW/Pearson, 2001.
3. CMOS mixed-signal circuit design by R. Jacob BakerWiley India, IEEE press, reprint 2008.
4. Design of analogCMOS integrated circuits by BehadRazaviMcGraw-Hill, 2003.

List of experiment:

Note : Use the BSIM3v3 (T-SPICE Level 49) model to characterize a 0.18 μ m CMOS process (TSMC).

1. Determine the threshold voltage V_{TH} , for the NMOS and PMOS devices (for $V_{BS}=0$, $L=0.18\mu\text{m}$ and $W=1\mu\text{m}$), by extrapolating from the $ID-V_{GS}$ curve at low V_{DS} . Explain your circuit setup. How does this result compare to values reported in the model file? Also, determine the body-effect parameter.
2. Determine the subthreshold slope factor S for the NMOS and PMOS devices (at $V_{DS}=1.8\text{V}$, room temperature). Determine the leakage currents at $V_{GS}=0\text{V}$. Repeatit at a lower temperature $T=77\text{k}$.
3. Determine the effects of channel length L on the threshold voltage V_{Th} between $0.18\mu\text{m}$ to $2.0\mu\text{m}$. Draw V_{Th} of the NMOS and PMOS as a function of L (for $V_{DS}=1.8$ and 1.2V).
4. Determine the effects of drain-source voltage V_{DS} , on the threshold voltage V_{Th} between and 1.8V . Draw V_{Th} as a function of V_{DS} (for $L=0.18\mu\text{m}$). What is the measured DIBL factor?
5. With the given CMOS inverter Circuit calculate and estimate the static Characteristics
 - a. Determine the VTC of CMOS Inverter
 - b. Obtain the NMH, NML, and VM for the inverter Dynamic Characteristics
6. Measure the t_{pHL} , t_{pLH} , t_P , t_r , t_f
7. Power Consumption with varying load capacitances from 100fF to 500fF . And compute the power Delay Product (PDP) foe the 0.18 Micron technologies.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP4E3	L	T	P	L	T	P	Total
Mobile Computing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective:

- The focus of the course is on development and delivery of Android based software for mobile devices

Prerequisites : Programming ability and an understanding of basic JAVA

COURSE CONTENTS

UNIT-1

An Open Platform for Mobile Development,Native Android Applications,Android SDK Features,Introducing the Open Handset Alliance,Introducing the Development Framework,Developing for Android,Developing for Mobile Devices,Android Development Tools

UNIT-2

Creating Applications and Activities,Introducing the Application Manifest,The Android Application Life Cycle ,Understanding Application Priority and Process States ,Externalizing Resources,Creating User Interfaces,Fundamental Android U I Design,Introducing Views,Introducing Layouts,Creating New Views,Creating and Using Menu s

UNIT-3

Introducing Intents,Introducing Adapters, Using Internet Resources, Introducing Dialogs,Android Techniques for Saving Data,Saving Simple Application Data,Saving and Loading Files,Databases in Android,Introducing Content Providers

UNIT-4

Maps, Geocoding, and Location-Based Services,Setting up the Emulator with Test Providers,Selecting a Location Provider,Using Proximity Alerts,Using the Geocoder,Creating Map - Based Activities,Working in the Background, Introducing Services,Using Background Worker Threads,Introducing Notifications,Using Alarms.

UNIT-5

Peer-to-Peer Communication, Introducing Android Instant Messaging, Introducing SMS, Accessing Android Hardware, Using the Media APIs, Camera, Sensor Manager, Accelerometer and Compass, Bluetooth, Android Telephony, Managing Network and Wi-Fi Connections, Controlling Device Vibration, Advanced Android Development, Paranoid Android, Using AIDL to Support IPC for Services, Implementing an AIDL Interface, Building Rich User Interfaces

Course Outcomes:

After the completion of course student will be able to

- Learn the Android Applications
- Practical approaches using Android SDK
- Features, Introducing the Open Handset Alliance,
- Learn how to design application using Android UI
- Practical application creation using Design, Views Layouts.
- Learn how to make Data, Saving and Loading Files
- Creation of Databases in Android,

Books Recommended:

1. Reto Meier, "Professional Android Application Development", Wiley Publication, 2009.
2. J.F. DiMarzio, "Android A Programmer's Guide", TATA McGraw Hill, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP4S2: Soft Skill-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics Groups – Definition & Meaning, Stages & Process of Group Formation, types,

Work Group Behavior – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining Team:

Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics Power & Politics:

Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

BOOKS RECOMMENDED:

BOOKS RECOMMENDED:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
2. R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
3. Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
4. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

INDUSTRIAL ENGINEERING & MANAGEMENT

Part Time

II YEAR

SEM IV

Sub Code	SubName	L-T-E	Sub Type
IMP4C3	Supply Chain Management	3-1-1 =5	PC6
IMP4Ex	<i>Elective II</i>	3-1-1 =5	PE2
IMP4W2	Seminar/ Res. Tool/Work Shop-2	0-2-0=2	
ASP4S2	Soft Skills -2	2-0-0 =2	
IMP4V4	Comprehensive Viva IV	0-0-2=2	
Total Credit for SEM IV		14 actual + 2 Virtual credits	

List Of Electives

IMP4E1	Marketing Management	3-1-1 =5	PE
IMP4E2	Product Design And Manufacturing	3-1-1 =5	PE
IMP4E3	Customer Relationship Management	3-1-1 =5	PE
IMP4E4	Industrial Marketing	3-1-1 =5	PE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMP4C3 SUPPLY CHAIN MANAGEMENT	3	1	1	3	1	1	5

Objectives and Pre requisites:

- To inbuilt the concepts of Logistics and supply chain Management.
- To strengthen skills related to supply chain strategies decisions.

COURSE CONTENTS

UNIT-1

Introduction to Supply chain:

Introduction to supply chain. Objective of supply chain, Process view of supply chain, Supply chain management, supply chain challenges, Supply Chain performance. Competitive and Supply chain strategies, achieving strategic fit, expanding strategies scope, Supply chain drives & obstacles: Frame work, inventory, transportation facilities, information, and obstacles to achieving fit.

UNIT- 2

Designing the Supply Chain Network:

Role of distribution in supply chain, factors influencing distribution network, design options, e – business and distribution network.

Network Design in supply chain: Role of network design, factors influencing, framework for network design decision, role of IT.

UNIT-3

Sourcing decision in Supply chain

Role of sourcing, supplier scoring, design collaboration, sourcing planning and analysis, role of IT in sourcing, Risk management, in sourcing, design collaboration, making sourcing decisions in practice

UNIT-4

Transportation in supply chain

Transportation in supply chain: Factors affecting transportation decision , modes of transportation & their performance characteristics , design options , tradeoffs , tailor transportation , routing & scheduling in Transportation , Network design in supply chain : Factors affecting network designing decisions, frame work, models , information technology in supply chain

UNIT-5

Supply chain coordination and Information technology

Understanding lack of coordination and Bullwhip effect, obstacle to coordination in supply chain, managerial levers to achieve coordination, building strategic partnership, collaborative planning, forecasting, achieving coordination in practice.

Role of IT in supply chain, supply chain IT frame work, supply chain IT in practice

Course outcomes

After completing the course the student will able to:

- Learn the concept of supply chain, Supply chain management, supply chain challenges
- Understand various Risk management, in sourcing, design collaboration, making sourcing decisions in practice
- Learn the procedure of routing & scheduling in Transportation
- Learn the drawbacks of lack of coordination and Bullwhip effect
- Learn about supply chain IT in practice

BOOKS RECOMMENDED:

- Pinkerstein & Guertin, Integrated logistics support, IFS publication U.K., 1988
1. Hutchinson Norman E., an Integrated approach to logistics management, PHI, 1987
 2. Copra Sunil & Meindl Peter, Supply chain management. McGraw-Hill, 1998.
 3. Mentzer, Supply chain management. . Sage Publications, 2004
 4. Chistofer M., Logistics & supply chain management. 1998.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMP4E1 MARKETING MANAGEMENT	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites:

- To build a strong foundation of Marketing concepts & to acquaint the students about the different Marketing Functions.
- To develop the skills of Marketing Strategies formulation & its implementation in an organization to maximize profits and improvement of Brand Image.

COURSE CONTENTS

UNIT-1

Introduction:

Tasks and philosophies of marketing MANAGEMENT, the marketing system and environment, system and environment, system approach to marketing. Marketing Organization, Organization of marketing department, responsibilities and functions of marketing managers, interaction of marketing in other functions.

UNIT-2

Marketing Research:

Scope and objective, planning and formulating marketing research projects, methods of collecting data, analysis and evolution of data, consumer behavior analysis, vendor analysis.

UNIT-3

Product Planning:

Product policy decision, life cycle innovation, product failure, introduction new products, product mix strategies, product portfolios management ,BCG GF-directional matrices, planning & budgeting for establishing and new products- MARMIX model.

UNIT-4

Sales Promotion and Advertising:

Role of promotion and advertising, type of promotion and advertising method, promotion and advertising appropriation, development and evaluation of advertising program.

UNIT-5

Distribution & Sales Function:

Importance of middlemen, types of distribution channel, channel design decisions, problems in channel determination and uses. Recruitment, selection, training, motivation and compensation of sales force, controlling and evaluating.

Course outcomes

After completing the course the student will able to:

- Learn about different philosophies of marketing concepts.
- Learn the Importance of middlemen, types of distribution channel, different marketing organizations.
- Having knowledge of marketing research approaches adopted by business organisation.
- Case studies related to product development and planning by different organisation.
- Case studies related to sales promotion and advertising practices of different organisation product portfolios management, BCG GF-directional matrices, planning.
- Learn about sales promotions practices of different organisation.
- Able to make Product policy decision.
- Learn about life cycle innovation and product failure.

BOOKS RECOMMENDED:

1. Kotler Philip, *Marketing management, planning, analysis and control*. PHI, 2001
2. Cundiff, Still & Govoni, PHI. , 2003

Devi Ahilya University, Indore Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
IMP4E2 PRODUCT DESIGN & MANUFACTURING	3	1	1	3	1	1	5
Duration of Theory Paper:3 Hours							

Objectives & Pre requisites :

- To impart the basics of Product Design & Development of a new Product.
- To sharpen the skills of the students to understand the different manufacturing processes/ systems for new product development.

COURSE CONTENTS

UNIT -1

Introduction

Characteristics of successful product development, Design and development of products, duration and cost of product development, the challenges of product development. Development Processes and Organizations: A generic development process, concept development: the front-end process, adopting the generic product development process, the AMF development process, product development organizations, the AMF organization.

UNIT -2

Product Planning

The product planning process, identify opportunities. Evaluate and prioritize projects, allocate resources and plan timing, complete pre project planning, reflect all the results and the process.

UNIT - 3

Identifying Customer Needs

Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process. Product Specifications: What are specifications, when are specifications established, establishing target specifications, setting the final specifications.

UNIT - 4

Concept Generation

The activity of concept generation clarify the problem, search externally, search internally, explore systematically, and reflect on the results and the process. Concept Selection:

Overview of methodology, concept screening, and concept scoring, Concept Testing: Define the purpose of concept test, choose a survey population, choose a survey format, communicate the concept, measure customer response, interpret the results.

UNIT – 5

Design for Manufacturing

Definition, estimation of manufacturing cost, reducing the cost of components, assembly, supporting production, impact of DFM on other factors. Prototyping: Prototyping basics, principles of prototyping, technologies, planning for prototypes. Product Development Economics: Elements of economic analysis, base case financial mode, Sensitive analysis, project trade-offs, influence of qualitative factors on project success, qualitative analysis.

Course outcomes

After completing the course the student will able to:

- Learn about Characteristics of successful product development, Design and development of products.
- Practical knowledge of Development Processes and Organizations.
- Learn how to make the product planning process, identify opportunities.
- Well understanding of Customer Needs.
- Perform Sensitive analysis, project trade-offs.
- Sensitive analysis, project trade-offs.

BOOKS RECOMMENDED:

1. Ulrich Karl.T. & Eppinger Steven D., “Product Design and Development” Irwin McGrawHill- 3e, 2000.
2. Chitale A. C. and Gupta R. C., PH1, “Product Design and Manufacturing”, 3e, 2003.
3. Timjones Butterworth Heinmann, “New Product Development” Oxford. UCI. 1997.
4. Boothroyd G., Dewhurst P. and Knight W., “Product Design forManufacture and Assembly”,**2002**.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name IMP4E3 CUSTOMER	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
RELATIONSHIP MANAGEMENT Duration of Theory	3	1	1	3	1	1	5
Paper: 3 Hours							

Objective and Pre requisites:

- To make the students understand the organizational need, benefits and Process of creating long-term value for individual customers.
- To disseminate knowledge regarding the concept of eCRM and eCRM technologies.
- To enable the students understand the technological and human issues relating to Implementation of CRM in industries.

COURSE CONTENTS

Unit-I introduction

Definition of CRM as a business strategy ,elements of CRM ,CRM process and system .Strategy and organization of CRM ,History of CRM ,Dynamics of customer supplier relationship, Nature and context of CRM strategy ,The relationship oriented organization

Unit-2 Marketing Aspects of CRM

Customer knowledge, privacy issue, communication and multi channel in CRM,the individual customer proposition ,relationship policy .

Unit-3: Analytical CRM

Relationship data management, Data analysis and data mining, segmentation and selection ,Retention and cross sell analysis ,Effects of marketing activities, Reporting results operational CRM:Call centre management ,Internet and website ,Direct mail collaborative CRM

UNIT-4

CRM Subsystems:

Contact Management, Campaign Management, Sales Force Automation, Choosing CRM Tools / Software Package: Short listing prospective CRM vendors, setting evaluation criteria for the appropriate CRM package, selection

UNIT-5

CRM implementation:

CRM systems and Implementation: CRM systems, Implementation of CRM systems Applications in various industries: Applications in manufacturing, banking hospitality and telecom Sectors, Ethical Issues in CRM

Course outcomes

After completing the course the student will able to:

- Get deep knowledge of CRM as a business strategy.
- Learn about Dynamics of Customer Supplier Relationships.
- Make study on various aspects related to Marketing Aspects of CRM.
- Learn about Relationship data management.
- Learn about Contact Management, Campaign Management,
- Sales Force Automation.
- Case studies related to CRM implementation.

BOOKS RECOMMENDED:

1. Peelen , Customer Relationship Management , Ed. Pearson 2004.
2. Zikmund, William G. Customer Relationship Management: Integrating Marketing Strategy & Information Technology John Wiley. 2006.
3. Greenberg, P CRM at the Speed of Light, 4th e. Mcgraw Hill 2009.
4. Brown , Stanley , Customer Relationship Management, A strategic Imperative in the World of eBusiness . John Wiley & Sons 2008.
5. Peppers, D. / Rogers, Martha. Doubleday The One to One B2B: Customer Relationship Management Strategies for the Real Economy Business 2001

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time			
Subject Code & Name IMP4E4 INDUSTRIAL MARKETING	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	1	3	1	1	5

Objective and Pre requisites:

- The objective of this course is to help the students develop an understanding of the dimensions of the Marketing, with particular reference to Industrial reference and practices at national and international level.

COURSE CONTENTS

UNIT-1

Nature of Industrial Marketing

Industrial Marketing Vs. Consumer Marketing, Relational approach to Industrial Marketing- The Nature of Industrial Demand & Industrial Customer

UNIT-2

Types of Industrial Products

Major Equipment; Accessory Equipment; Raw and Processed Materials; Component Parts and Sub- Assemblies; Operating Supplies; Standardized and Non-standardized parts, Industrial services

UNIT-3

Organizational Buying

Factors influencing Organizational Buying, Buying Roles; Organizational Buying Decision Process; environmental & organizational Influences, Organizational Influences on Buying Behavior: Buying Roles; The Buy Grid Model; The Organizational Buying Decision Process

UNIT-4

Industrial Product Decisions

Industrial Product Life Cycle, Industrial Product Mix determinants viz. technology, competition, operating capacity, shift in location of customers, government controls, changes in level of business activity, Channel Structure for Industrial Products, Geographical, size, operating characteristics manufacturers' and sales agents Brokers Channel Logistics
Purchasing systems – Auctions- Documentation bids order placement follow up receipt and inspection

UNIT-5

Pricing & Promotion for Industrial Products

Pricing Objectives ,Price Decision Analysis , Breakeven analysis, net pricing, discounting , trade discounts, geographic pricing , factory pricing , freight allowance pricing ,Terms of Sale, Outright purchase , Hire-purchase , Leasing Promotion for Industrial products , Supporting salesman , Motivating distributors , Stimulating primary demand , Sales appeal , Publicity & sponsorships , Trade shows, exhibits , Catalogs, Samples promotional letters – Promotional novelties

Course outcomes

After completing the course the student will able to:

- Learn the difference between Industrial Marketing Vs. Consumer Marketing.
- Learn the art of using raw and processed materials
- Learn how to make use of Component Parts and Sub- Assemblies
- Learn about various factors influencing Organizational Buying
- Learn about Industrial Product Life Cycle, Industrial Product Mix determinants

BOOKS RECOMMENDED:

- 1 Ralph S. Alexander, James S. Cross [and] Richard M. Hill., Industrial marketing - 3d ed. Homewood.
- 2 Reeder, Robert R., Brierty, Edward G. and Reeder, Betty H, Industrial Marketing Analysis, Planning and Control. Publisher: Prentice Hall ,1991.
- 3 **P K Ghosh Industrial Marketing** Oxford University Press India 2005
- 4 Havaladar, Krishna **Industrial Marketing**, Tata McGraw-Hill 2010.
- 5 C S G Krishnamacharyulu, Lalitha R , **Industrial Marketing** , Jaico Publishing House, 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP4S2: Soft Skill-2	L	T	P	L	T	P	Total
		2	-	-	2	-	-
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics Groups – Definition & Meaning, Stages & Process of Group Formation, types,

Work Group Behavior – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining Team:

Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics Power & Politics:

Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization.

Organizational Culture & National Culture, Resistance to Change & Change Management.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

BOOKS RECOMMENDED:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
2. R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
3. Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
4. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

M.E(DESIGN & THERMAL)

Part Time

II YEAR

SEM-IV

S.no	Sub-code	Sub-name	L-T-P	Sub-Type
1.	DTP4C3	Computer Aided Modeling and Simulation	3-1-1 =5	PC6
2.	DTP4Ex	<i>Elective II</i>	3-1-1 =5	PE2
3.	DTP4W2	Seminar/ Res. Tool/Work Shop-2	0-2-0=2	
4.	DTP4V4	Comprehensive Viva IV	0-0-2=2	
5.	ASP4S2	Soft Skills -2	2-0-0 =2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	

List Of Electives

2	DTP4E1	Machine Vibration Analysis	3-1-1 =5	PE
2	DTP4E2	Experimental Stress Analysis	3-1-1 =5	PE
2	DTP4E3	Applied Elasticity and Plasticity	3-1-1 =5	PE
2	DTP4E3	Automotive Systems: Analysis and Design	3-1-1 =5	PE

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E. (Design & Thermal Engg.) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTP4C3 Computer Aided Modeling and Simulation	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives:

- To understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- To model complex shapes including freeform curves and surfaces. To understand various graphics standard for CAD data exchange (such as IGES, PARA etc).
- To understand the application of Computers in Analysis and Design of Machine Elements.

COURSE CONTENT

UNIT - 1

INTRODUCTION

Fundamentals of CAD: Introduction: Design Process: Application of computers in design: Benefits of CAD. Computer Hardware: Graphic input devices; display devices; Graphic output devices; Central processing unit (CPU), Workstations.

UNIT- 2

COMPUTER GRAPHICS

CAD software and Database: Software configuration of a graphics system, Output primitives frame buffer – Bresenham’s Algorithm – Line – Circle – function of graphics software - 2D & 3D transformation – Translation – scaling – Rotation – Homogeneous coordinate – Concatenation, clipping algorithm.

UNIT - 3

TECHNIQUES FOR GEOMETRIC MODELING

Geometric Modelling: Curves And Surfaces- Representation, Wire Frame models, Intrinsic and parametric representations, analytic and parametric curves and surfaces, Manipulations of curves and surfaces.

UNIT- 4

TECHNIQUES FOR GEOMETRIC MODELING AND DATA EXCHANGE STANDARDS

Geometric Modeling: Solids- Solid models, Fundamentals of Solid Modeling, Half -spaces, Boundary Representation (B-rep), Constructive Solid Geometry (CSG), Sweep Representation, Analytic Solid Modeling, Solid Manipulations.

Graphics standards – GKS, Data exchanger standards – IGES – STEP - DXF – Concept of data storage for solid models.

UNIT - 5

VISUAL REALISM

Introduction, Model Clean-up, Hidden Line Removal, Hidden Surface Removal, Hidden Solid Removal, Shading, Coloring and User Interface for Shading and Coloring, Introduction to CAD Modeling Systems. Tolerance and Interference Analysis

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- Can model complex shapes including freeform curves and surfaces.
- Understand various graphics standard for CAD data exchange (such as IGES, PARA etc).
- Understand the application of Computers in Analysis and Design of Machine Elements.

Text Book:

1. Zeid Ibrahim and R Sivasubramanian, *CAD / CAM Theory and Practice*, 2nd Edition, 3rd Reprint, 2010, Tata McGraw Hill Education Private Limited, New Delhi.
2. P N Rao, *CAD/CAM Principles and Applications*, 3rd Edition, 4th Reprint, 2011, Tata McGraw Hill Education Private Limited, New Delhi.
3. M Groover and E Zimmers, *CAD/CAM Computer Aided Design and Manufacturing*, 10th Impression, Pearson Education.
4. Krishnamoorathy C.S. and J.S. Rajeev, *Computer Aided Design (Software and Analysis Tools)*, Narosa Pub House, New Delhi

List of Practicals:

1. To draw the basic geometrical shapes such as line, triangle, rectangle etc using programming language Autolisp/C++/etc.
2. To perform the various geometrical transformations on the geometrical shapes drawn in practical 1 using programming language Autolisp/C++/etc.
3. To model the simple machine elements like gear, shaft, pulleys, cams etc parametrically using CAD/CAM software.
4. To obtain the 2d drawings from the 3d object created in practical 3.
5. To create the assembly of machine elements using CAD/CAM software.
6. To perform the finite element analysis of machine elements using CAD/CAM Software.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTP4E1 MACHINE VIBRATIONS ANALYSIS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject:

- The objective of the subject is to deal with machine vibration analysis techniques and advanced areas of vibrations of machine elements based on Undamped and Damped Free Vibrations for single degree of freedom systems, Multi-degree of Freedom and Continuous Systems .
- Pre requisites are Theory of vibrations , Machine Design I and Machine Design II.

COURSE CONTENTS

UNIT-1

Review: Fundamentals of Vibration

Main causes, Advantages and Disadvantages. Vector method of representing Harmonic motion. Characteristics of vibration. Harmonic analysis. Beats Phenomenon. Work done by harmonic forces on harmonic motion. Periodic, non-harmonic functions: Fourier Series analysis, Evaluation of coefficients of Fourier series. Elements of vibratory system. Lumped and distributed parameter systems.

UNIT -2

Systems with single and two Degrees of Freedom

Forced harmonic vibration: vector representation of forces. Excitation due to Rotating and Reciprocating unbalance. Vibration isolation, Force transmissibility. Motion transmissibility: absolute motion of mass and relative motion of mass.

Undamped free vibrations and Principal Modes of vibration. Torsional vibrations. Forced Undamped vibrations with harmonic excitation.

UNIT -3

Systems with Multi-degree of Freedom and Continuous Systems.

Equations of motion. The Matrix method : Eigen values and eigen vectors. Vibration of Strings. Longitudinal vibrations of bars. Torsional vibrations of Circular Members. Transverse Vibrations of Beams.

UNIT -4

Determination of Natural Frequencies

Approximate methods of determining fundamental frequencies: Dunkerleys lower bound approximation and Rayleighs Method. Stodolas Method. The Holzers Method. The Method of Matrix Iteration, Envelop Analysis.

UNIT -5

Numerical Integration methods in Vibration Analysis

Introduction, Finite Difference Method, Runge-Kutta Method for single degrees of freedom systems, Houbolt method, Finite Difference method for continuous systems.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Learn various Fourier series analysis, Evaluation of coefficients of Fourier series. Elements of vibratory system. Lumped and distributed parameter systems.
- Understand the concept of undamped free vibrations and Principal Modes of vibration. Torsional vibrations

BOOKS RECOMMENDED: Reference books:

1. Thomson W.T., *Theory of Vibration with Applications*, CBS Pub. And Distributors.
2. Morse T., and Hinkle, *Mechanical Vibration*, Prentice Hall of India Pvt. Ltd.
3. Singiresu S. Rao, *Mechanical Vibrations*, Pearson Education.,2005
4. Ambekar A. G., *Mechanical Vibrations and Noise Engineering*, Prentice Hall of India Pvt. Ltd.,2006
5. G. K. Grover, *Mechanical Vibrations*, Nem Chand and Bros., Roorkee.

LABORATORY EXPERIMENTS:

1. Performance Analysis of two degree of systems.
2. Performance Analysis of multi degree of systems.
3. Study of vibration signature analysis methods
4. Study of vibration measuring instruments

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTP4E2	L	T	P	L	T	P	Total
EXPERIMENTAL STRESS ANALYSIS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective & Pre requisites:

- The basic objective of the subject is to deal fundamentals of stress analysis techniques.
- The subject is useful in understanding the behavior of material under the load.
- Distribution of stress inside the material. The Pre requisites are material science, machine design and measurement and control.

COURSE CONTENTS

UNIT- 1

Introduction: Introduction to theory of elasticity. General principles governing the approach to experimental stress analysis technique. Principal of measurements. Accuracy, Sensitivity and range of measurement.

UNIT- 2

Polariscope & Extensometer: Plain polariscope, circular polariscope, white light illumination, analysis of photo elastic data, Moira Method, Mechanism of formation of Moira fringe-geometrical approach to Moire fringe analysis-displacement field approach to Moiré fringe analysis., Mechanical , Optical , Acoustical and Electrical extensometer and their uses, advantages and disadvantages.

UNIT- 3

Electrical Resistance Strain Gauge: Principal of operation and requirement, types and their uses, Material of strain gauge, Calibration and temperature compensation, cross sensitivity, Rosette analysis, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators, strain gauge adhesive and mounting methods.

UNIT-4

Photo elasticity:

Two dimensional photo elasticity. Concepts of light-photo-elastic effects, stress optic law, Interpretation of fringe pattern, compensation and separation technique, photo elastic material, Introduction to three dimensional photo elasticity, digital photo elasticity, Effects of stressed model in a plane polar scope.

UNIT- 5

Non Destructive Testing: Fundamentals of NDT, Radiography, Ultrasonic, Magnetic particle inspection, Fluorescent penetrate technique, Eddy current testing, Acoustic Emission

Technique, Fundamentals of brittle coating methods, Holography, Ultrasonic, C-Scan, Thermography, Fibre optic Sensors.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Learn the concept of Principal of measurements. Accuracy, Sensitivity and range of measurement.
- Learn the concept of temperature compensation, cross sensitivity, Rosette analysis
- Apply Material of strain gauge, Calibration and temperature compensation, cross sensitivity concept
- Learn the concept of three dimensional photo elasticity, digital photo elasticity, Effects of stressed model in a plane polariscope.

BOOKS RECOMMENDED

1. Dally J.W. and Riley, W.F. “*Experimental Stress Analysis*” Mc Graw Hill Inc., New York, 1978
2. Hetenyi M “ *Hand Book of Experimental Stress Analysis*” John Wiley and Sons Inc. New York, 1972.
3. Srinath L.S., Raghava M.R.,Lingaiah, K.Gargesha G, Pant B, Ramchendra K., “ *Experimental Stress Analysis*” Tata Mc Graw Hill, New Delhi., 1984
4. Singh S. “*Experimental Stress Analysis*” Khanna Publication, 2001.
5. Mubeen., *Machine Design*, , Khanna Publications(P) Ltd.,2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTP4E3	L	T	P	L	T	P	Total
APPLIED ELASTICITY AND PLASTICITY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject:

- With this subject, the students get knowledge of the various Mechanical engineering materials property as well as behavior of material under Elastic & Plastic zone with different plane of surface.

Prerequisite(s): Strength of Material, Material Science.

COURSE CONTENTS

UNIT - 1

Elasticity

Analysis of stress and strain relationship – Generalized Hook’s law, Plane stress and plane strain problems, The state of strain at a point, Basic equations of elasticity, Methods of solution of elasticity problems.

UNIT- 2

Two-Dimensional Problems in Cartesian Co-Ordinates

Two dimensional problems in Cartesian and polar co-ordinates for simple problems, Airy’s stress function, Bi harmonic equation, Saint Venant’s Principle, Thick cylinder, Bending of curve bars , Simply supported rectangular beam under a triangular load, Fourier series, Complex potentials, Cauchy integral method , Fourier Transform Method, Real potential methods.

UNIT-3

Torsion of Non Circular Section

Methods of analysis, Membrane analogy, Torsion of thin rectangular section and hollow thin walled section, St. Venant’s theory, Torsion of hollow cross-sections, Torsion of thin – walled tubes, Torsion of hollow bars, Analogous methods, Torsion of bars of variable diameter.

UNIT-4

Numerical and Energy Methods

Principle of Virtual Work-Energy theorem, Rayleigh Ritz method, Deflection of beams problems, Finite difference method, Rayleigh’s method, Finite element method.

UNIT-5

Plasticity

Physical assumption , Mechanical models, Kelvin and Maxwell model, Viscous elasticity, Friction and Coulomb models, Parallel and Hybrid models, Applications, Criterion of Yielding, Yield surface, Flow rule, Elastic – Plastic problem in bending, Torsion and Thick cylinders, Introduction to Fracture mechanics, Wave propagation in plastic materials. Theory and application of slip line field, Bound theorem, Plastic anisotropic large deformation.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Perform Analysis of stress and strain relationship
- Saint Venant's Principle, Thick cylinder, Bending of curve bars , Simply supported rectangular beam under a triangular load, Fourier series, Complex potentials,
- Apply Torsion of thin – walled tubes, Torsion of hollow bars, Analogous methods, Torsion of bars of variable diameter.

BOOKS RECOMMENDED:

1. Singh S., *Theory of Plasticity*, Khanna Publishers, New Delhi.1988
2. Timoshenko S., *Theory of Elasticity*, Mc Graw Hill Book Co., Newyork1988.
3. Singh S, *Theory of Elasticity*, Khanna Publishers, New Delhi.1988..
4. Chakrabarty J., "*Applied Plasticity*", Springer New Yark, 1st ed. 2000.
5. Hoffman, "*Theory of Plasticity*", Mc Graw Hill, 2nd ed. 1985.
6. Johnson, "*Engineering plasticity*", Van Nostrand, 1st ed. 1983.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
DTP4E4	Week			Credits			
	L	T	P	L	T	P	Total
AUTOMOTIVE SYSTEM ANALYSIS & DESIGN	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective:

- The objective is to understand the principles and working of different systems of Automobiles & design principal & its applications.

Pre requisites: Machine Design and Strength of Material.

COURSE CONTENT

UNIT-1

Design for Tool Drive

Design of machine tools, machine tools motions, transmission-rotation in to rotation, rotation in to translation, kinematic-structures of machine tools: elementary, complex and compound structure elementary, complex and compound structure, kinematic-features of gear shapers and

UNIT-2

Transmission System

Requirements Clutches, Toque converters, Over Drive and free wheel, Universaljoint. Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle. Castor Angle, wheel camber, Steering geometry, Ackerman mechanism.

UNIT-3

Electrical and Control Systems

Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Electric fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Battery operated vehicles. Microprocessor based control system for automobiles, Car air conditioning systems and components, Indian standards for automotive vehicles exhaust emission Bharat and Euro norms, Indian Motor vehicle act- preliminary information.

UNIT-4

Chassis and Body Engineering

Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Location of engine, Front wheel and rear wheel drive, Performance of Vehicle.

UNIT-5

Suspension System

Vehicle Dynamics and requirement of suspension , Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, ABS, Performance- Braking efforts, Efficiency, Stopping Distance & time, tendency of over turning.

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Can apply kinematic-structures of machine tools: elementary, complex and compound structure elementary, Learn the concept of Gear Mechanism of Rear Axle. Automatic transmission

BOOKS RECOMMENDED:

1. Singh Kirpal, Automobile Engineering, Vol.1, Standard Pub, 9e.
2. Giri N.K., Automotive Technology, Khanna Pub, 4e 2009.
3. Newton & Steeds, Automobile Engineering, Butterworth Int.
4. Heitner Joseph, Automotive Mechanics, Principles and Practices, East-West Pub.
5. Crouse W.H., Automotive series Part-I to VI, Tata McGrawhill, 9e.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E.(Industrial Engineering and Management) Part Time B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP4S2: Soft Skill-2	L	T	P	L	T	P	Total
		2	-	-	2	-	-
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics Groups – Definition & Meaning, Stages & Process of Group Formation, types,

Work Group Behavior – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining Team:

Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics Power & Politics:

Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization.

Organizational Culture & National Culture, Resistance to Change & Change Management.

Course Outcomes:

After the completion of course student will be able to

- Learn the concept of Transformational Leadership Theory, Charismatic Theory.
- Will perform SWOT Analysis
- Understanding of Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.
- Apply the Critical Thinking in Problem Solving Steps in .
- Will have the knowledge of the General Adaptive Syndrome Model of Stress..
- Can apply Conflict Management-Sources,
- Learn the Impacts of Conflict and Conflict Resolution.

BOOKS RECOMMENDED:

BOOKS RECOMMENDED:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
2. R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
3. Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
4. Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

**Applied Science
MSC –II nd Year
IVth Semester
Scheme&Syllabus**

SEM IV

S.No	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM4PC1	Complex Analysis	3-1-0	Core
2.	AM4PC2	Analysis of Algorithm	3-1-0	Core
3.	AM4PC3	Functional Analysis	3-1-0	Core
4.	AM4ECx	Discipline Elective III *	3-0-0	Disc. Elec.
5.	AM4EMx	Discipline Elective IV *	3-0-0	Disc. Elec.
6.	AM4Dxx	Discipline Elective V *	0-2-4	Diss. Work
7.	AM4PR4	Computer Lab-IV (Of Subject of Discipline Elective -III)	0-0-2	Practical
8.	AM4CV4	Comprehensive Viva IV	0-0-4	Viva
Total Credit for SEM IV			20 actual + 4 Virtual credits	
		List of Discipline Elective III		
1.	AM4EC1	Advanced Java	3-0-0	
2.	AM4EC2	Unix / Linux Administration	3-0-0	
3.	AM4EC3	Computer Network/ Internet & Web Technology	3-0-0	
		List of Discipline Elective IV		
1.	AM4EM1	Operations Research-II	3-0-0	
2.	AM4EM2	Mathematical Modeling	3-0-0	
3.	AM4EM3	Number Theory/Cryptography	3-0-0	
		List of Discipline Elective V		
1.	AM4DW1	Dissertation (Minor)*	0-0-4	
2.	AM4DS1	Seminar	0-2-0	

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4PC1: Complex Analysis	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To study the techniques of complex variables and functions together with their derivatives, Contour integration and transformations.
- To study complex power series, classification of singularities, calculus of residues and its applications in the evaluation of integrals, and other concepts and properties.

Prerequisites: Set theory, calculus of real functions, algebra of complex numbers.

COURSE OF CONTENTS

UNIT I

Exponential and Trigonometric functions, Analytic (Holomorphic) functions, Necessary and sufficient condition for analyticity (Cauchy-Riemann equations), Polar form of Cauchy-Riemann equations, Harmonic functions, Harmonic Conjugate.

UNIT II

Complex Integration, Cauchy's theorem, Cauchy's Integral formula, higher order derivative of analytic function, Morera's Theorem, Poisson's integral formula for a circle, Cauchy's Inequality, Liouville's theorem.

UNIT III

Expansion of analytic function as power series : Taylor and Laurent theorem, Zeros of an analytic function, Singularities and types, Meromorphic functions, principle of Argument, Roche's theorem, , fundamental theorem of algebra, Maximum Modulus Principle, Schwarz Lemma.

UNIT IV

Residue, Cauchy's Residue theorem, evaluation of definite integrals, their properties and classification. Definitions and examples of conformal transformation, bilinear transformation, their properties and classification.

UNIT V

Harmonic functions and mappings, Inverse mappings, Schwarz's Reflection principle. Analytic continuation, uniqueness of direct analytic continuation and analytic continuation along a curve, power series method of analytic continuation. Homotopic curves, Monodromy theorem, Picard theorem.

Learning Outcomes:

Upon completing the course, students will be able to:

- Students will be equipped with the understanding of the fundamental concepts of complex variable theory and skill of contour integration to evaluate complicated real integrals via residue calculus.
- Apply problem-solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts.

BOOKS RECOMMENDED:

1. Walter Ruddin, Real and Complex Analysis, McGraw-Hill International Editions, 3/e, 1987.
2. Ahifors.L. V., Complex Analysis., McGraw Hill, New York, 2/e,1983.
3. Dr. H. K. Pathak, Complex Analysis, Shiksha Sahitya publication 2/e, 2007.
4. S.Ponnusamy : Foundations of Complex Analysis, Narosa Pub, `97.
5. Kasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4PC2:Analysisof Algorithm	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce approaches for analysing algorithms in various domains.
- Techniques for designing efficient algorithms.
- Have a sense of the complexities of various problems in different domains.

Prerequisite: Knowledge of data structures may assist the learning process.

COURSE OF CONTENTS

UNIT-I

Introduction to Algorithms: Design & analysis issues; Types of algorithms; Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

UNIT-II

Analysis of Some Sorting and Searching Algorithms: Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements.

UNIT-III

Algorithms Design Techniques: Divide-and-Conquer, Greedy Method, Dynamic programming, Backtracking and Branch-and-Bound; Illustration of above strategies using appropriate examples like; Knapsack problem, Optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, Queens problems, Travelling salesperson problem etc.

UNIT-IV

Analysis of Matrix and Polynomial Algorithms: Boolean Matrix Multiplication's; Strassen's matrix multiplication; Matrix chain multiplication problem; Solving Linear Equations, Computation of polynomials – Horner's method. String matching algorithms.

UNIT-V

Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Computational classes: – P, NP, NP Complete, and NP-Hard; reducibility, Decision

and optimization problems, Some NP and NP-Hard problems: Hamiltonian cycle, Traveling Salesperson (TSP). Satisfiability, Clique problems etc.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply design principle and concept to algorithm design.
- Knowledge of mathematical foundation in analysis of algorithms.
- Analyse the efficiency of algorithms using time and space complexity theory.
- Learn how to analyse algorithms and estimate their worst-case and average-case behaviour.
- Become familiar with fundamental data structure and with the manner in which these data structure can best be implemented.

BOOKS RECOMMENDED:

1. T.H. Cormen, C.E. Leiserson and R.L. Rivest, Introduction to Algorithms, Prentice Hall of India, 1990.
2. E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications, ND, 2002.
3. Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 2/e, 1988.
4. Knuth, D, The art of computer programming , Vols. 1-2-3, Addison Wesley, 1968-73.
5. A V Aho, J E Hopcroft & J D Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4PC3: Functional Analysis	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To study certain topological-algebraical structures and the methods by which the knowledge of these methods can be applied to analytic problems.
- The objectives of the course is the study of the main properties of bounded operators between Banach and Hilbert spaces, the basic results associated to different types of convergences in normed spaces and the spectral theorem and some of its applications.

Prerequisites: Set theory, algebra of functions.

COURSE OF CONTENTS

UNIT I

Linear Space, Normed linear spaces, Quotient norm spaces, linear transformation, Banach spaces, continuous linear transformations, bounded linear transformation, Linear Functional, Riesz lemma.

UNIT II

Conjugate space, Hahn-Banach theorem and its consequences, the natural embedding of the normed linear space in its second conjugate space, open mapping theorem, closed graph theorem, conjugate of an operator, uniform boundedness principle.

UNIT III

Inner product space, definition and examples of a Hilbert space, simple properties, orthogonal sets, orthonormal sets, Bessel inequality, conjugate space, Riesz representation theorem.

UNIT IV

Adjoint operator, self adjoint operators, Normal and unitary operators, Projections, Eigen values and eigenvectors of an operator on a Hilbert space, determinants and spectrum of an operator, spectral theorem on a finite dimensional Hilbert space.

UNIT V

Definition and example of Algebra, Banach Algebra, sub algebra, Normed Algebra, Regular and Singular elements and their properties, Spectrum, Spectral radius, Commutative Banach algebra, Involution in Banach algebra, Gelfand-Neumark representation theorem.

Learning Outcomes:

Upon completing the course, students will be able to:

- To learn to recognize the fundamental properties of normed spaces and of the transformations between them.
- Understand the notions of dot product and Hilbert space and apply the spectral theorem to the resolution of integral equations.
- Correlate Functional Analysis to problems arising in Partial Differential Equations, Measure Theory and other branches of Mathematics.

BOOKS RECOMMENDED:

1. E. Kreyszig, Introductory Functional Analysis with applications, John Wiley & Sons, 1989.
2. George F. Simmons, Introduction to topology and modern analysis, McGraw Hill Book Company Inc., 1963.
3. B. Chaudhary, S. Nanda, Functional Analysis with applications, Wiley Eastern Ltd., 1989.
4. H.L. Royden, Real Analysis, Macmillan Publishing Co. Inc. New York, 4th Edition, 1993.
5. Walter Rudin, Functional Analysis, McGraw-Hill Publishing Co., 1973.
6. H.K. Pathak, Functional Analysis with applications, Shiksha Sahitya Prakashan, 3rd Edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4EC1: Advanced Java	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objective:

- Learn the fundamentals of JDBC and using the different interfaces in the JDBC API.
- Learn how to use Java servlets in the role of Web application control.
- Identify the options to state management in a Java Web application and understand the pros/cons of each. Understand how JSPs can help to separate Web logic and functionality from page layout.
- Explore how to make JSPs smaller and more powerful with JSTL, custom tags and expression language. Explore strategies in the exchange of data between Web pages (views) and business processing (model).
- Learn the meaning and importance of EJB

Prerequisites: Basic Knowledge of Core Java, an understanding of Web technologies like HTML and HTTP is helpful, prior knowledge of Database will be supportive.

COURSE OF CONTENTS

UNIT I

Advanced I/O Streams: I/O fundamentals, Byte Streams, Character Streams, Node streams, Buffered Streams, Basic Byte Stream Classes, Basic Character Stream Classes. **Networking:** Sockets, Setting up the Connection, Addressing the Connection, Port numbers, Java Networking model, TCP/IP Server and Client, Datagrams, Cookies.

UNIT II

Abstract Windows Toolkit (AWT) : Components and Graphics, Containers, Frames and Panels, Layout Managers, Border layout, Flow layout, Grid layout, Card layout, AWT all components, Event delegation Model, Event source and handler, Event categories, Listeners, interfaces, Anonymous classes, Swing Libraries, Model view Controller design pattern, Different layout, menus dialog boxes, text input.

UNIT III

Introduction to JFC and Swing, Features of the Java Foundation Classes, Swing API Components, JComponent Class, Windows, Dialog Boxes, and Panels, Labels,

Buttons, Check Boxes, Menus, Toolbars, Implementing Action interface, Pane, JScrollPane, Desktop pane, Scrollbars, Lists and Combo Boxes, Text-Entry Components, Colors and File Choosers, Tables and Trees, Printing with 2D API and Java Print Service API. **Servlets:** Overview, Servlet Life Cycle, Servlet API, javax.servlet package, javax.servlet.http Package, JSP Page.

UNIT IV

JDBC: Overview, Types of JDBC drivers, JDBC applications, Types of statement objects (Statement, Prepared Statement and Callable Statement), Types of result set, Result Set Metadata, Inserting and updating records, JDBC and AWT, Connection pooling. **RMI:** Introduction & Architecture of RMI, Java RMI classes and interfaces, writing simple RMI application, Parameter passing in remote methods (marshalling and unmarshalling), Using RMI with Applets, Introduction to CORBA.

UNIT V

Introduction to EJB, Benefits of EJB, Types of EJB, Session Bean, Message-Driven Bean, Client **Access with Interfaces:** Remote Access, Local Access, Local Interfaces and Container-Managed Relationships, Web Service Clients, Method Parameters and Access, The Contents of an Enterprise Bean, Naming Conventions for Enterprise Beans, The Life Cycles of Enterprise Beans, The Life Cycle of a Stateful and Stateless Session Bean, The Life Cycle of a Message-Driven Bean Building Web Services with JAX-WS: Setting the Port, Creating a Simple Web Service and Client with JAX-WS.

Learning Outcomes:

Upon completing the course, students will be able to:

- Develop Swing-based GUI
- Develop client/server applications and TCP/IP socket programming
- Update and retrieve the data from the databases using SQL
- Develop distributed applications using RMI
- Develop component-based Java software using JavaBeans
- Develop server side programs in the form of servlets

BOOKS RECOMMENDED:

1. Herbert Schildt, Java: The Complete Reference 7th Edition, Tata McGraw Hill, 2006.
2. Dustine R Callway, Inside Servlets, Addison-Wesley, 2001.
3. James Goodwill, Developing Java Servlets. 2nd Ed., Sams, 2001.
4. Chad Darby, John Griffin, Pascal de Haan, Beginning Java Networking, Wrox Press, 2001.
5. Jim Keogh, Complete Reference- J2EE, ata McGraw-Hill Education, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4EC2: Unix/Linux Administration	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objective:

- To provide an introduction to an operating system that is assembled under the model of free and open source software development and distribution.
- To develop software in and for Linux/UNIX environments.
- Understanding the basic set of commands and utilities in Linux/UNIX systems.
- To learn to develop software for Linux/UNIX systems.
- To understand the inner workings of UNIX-like operating systems.

Prerequisites: Basics of DOS.

COURSE OF CONTENTS

UNIT I

Evolution of Unix OS, philosophy. Features of Unix operating system, Basic Architecture of Unix/Linux system, features of Kernel and Shell. Unix File system - Boot block, super block, Inode table, data blocks, How Unix/Linux kernel access files, Unix/Linux standard file system.

UNIT II

Basic UNIX environment: Basic commands, directory management, pipes, tee, I/O redirection and other utilities. **Advanced commands:** File system and process management commands, Shell, Pattern matching, navigating the File Systems.

UNIT III

Unix editor: VI editor, Creating new files. Text addition, deletion and changes. Dealing with sentences and paragraphs. Searching. Cut, paste and copy. Running C/C++ programs. **Shell programming:** Features of shell. Shell variables. Control statements. **Advance shell programming:** Command line arguments. Interactive shell scripts. Debugging of shell scripts. Communication facilities in Unix, Mathematical commands.

UNIT IV

Structure of Unix operating system: Structure of Unix kernel, Unix system calls. **Unix system:** File system calls, Process management calls. **Advance Filter:** Awk: Number processing, Interface with shell, functions.

UNIT V

Unix system administration: Adding and removing users. User accounting. Adding and removing hardware. Performing backups and restore. Disk space management.

Unix system administration: Configuring the kernel. Network management in Unix. Performance analysis. Unix Desktop. Installation of Unix/Linux system – Unix/Linux Installation requirement, complete Procedure steps, Partitioning the Hard drive, System startup and shut-down process, init and run levels. File system mounting, Ipstat, backup strategy, installing software on Unix/Linux.

Learning Outcomes:

Upon completing the course, students will be able to:

- Ability to Plan, Deploy and Linux Server
- Ability Monitor and Manage Linux Server.
- Perform the tasks of a Network Administrator.
- Write programme in using shell programming.

BOOKS RECOMMENDED:

1. Sumitabh Das, UNIX Operating Systems, Tata McGraw Hills publication, 2006.
2. Syed Mansoor Sarwar, Robert Kortskey , UNIX, Pearson Education, 2004.
3. Sumitabha Das, Unix concepts and Application, Tata McHill, 2008.
4. David Bandel and R. Napier, Using Linux, 6th Ed., Pearson Education, 2014.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4EC3: Computer Network/ Internet & Web Technology	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide an introduction to concepts of Computer Network
- To provide an understanding of its design issues as well as web technology.

Prerequisite(s): Communication System basics, Knowledge of Java Programming language (core).

COURSE OF CONTENTS

UNIT- I

Introduction: Overview, Goal and Applications of Computer Networks; Network Hardware -LAN, MAN, WAN and topologies; LAN components – File server, Workstations, Network Adapter Cards; Network Software - Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less services, Service primitives, Relationship between Services and Protocols; Switching Techniques – Circuit Switching and Packet Switching; Reference models – OSI and TCP/IP, comparison and critique of OSI and TCP/IP reference models.

UNIT- II

Data Link Layer: Design issues – Services, Framing, Error Control and Flow Control; Error Detection Techniques - Parity Check and Cyclic Redundancy Check (CRC); Error Correction Technique - Hamming code; Elementary Data Link Protocols - Unrestricted Simplex Protocol, Simplex Stop-and-Wait Protocol, Sliding Window Protocols : One-Bit Sliding Window Protocol, protocol using Go Back N and Selective Repeat; HDLC protocol; Data link layer in the Internet - SLIP and PPP.

UNIT- III

Network Layer: Internetworking: Concepts and Architecture. Routing: different routing algorithms, Congestion Control, Addressing- IP Addressing and subnet masking, CIDR , IPv6, IP protocol and other supporting protocols at IP layer: ARP, RARP, ICMP

Transport Layer: Transport Service; Elements of transport protocols - Addressing, Connection establishment, Connection release, Flow control and Buffering, Multiplexing; The Internet Transport Protocols - UDP and TCP, The TCP Service Model, The TCP Protocol.

Application layer: Client Server Architecture, DNS, WWW and HTTP, E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET. Overview of network security.

UNIT-IV

Introduction to HTTP, web Server and application Servers, Installation of Application servers, Config files, Web.xml. Java Servlet, Servlet Development Process, Deployment Descriptors, The Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet.

UNIT -V

Various methods of Session Handling. Various elements of deployment descriptors. Java Database Connectivity: steps in process of connection to the database, types of JDBC Drivers. Introduction to Web Services, MVC Architecture, Struts and Hibernate.

Learning Outcomes:

Upon completing the course, students will be able to:

- Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers.
- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- Have a basic knowledge of the use of cryptography and network security.
- Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
- Understand how the Internet works today.

BOOKS RECOMMENDED:

1. W.Stallings, Data and Computer Communications, Prentice-Hall, 5th Ed., 1997.
2. Conner Doughlous, Steven, Computer Networks and Internets, 5th Ed., Prentice-Hall, 2009.
3. A.S. Tanenbaum, Computer Network, 4th Ed., Pearson Education, 2007 .
4. D.E.Comer, Internetworking with TCP/IP Vol. I, 6th Pearson Education, 2013.
5. Umesh Kumar Singh, Internet and Web Technology, Images Publication, 2002.
6. Black Uyless, Computer Network, Prentice-Hall, 2nd Ed., 1993.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4EM1: Operations Research-II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- The course aims at making the students aware of the various techniques, which provides an analytical and objective basis for decisions. These techniques use scientific methods to problems arising from operations involving integrated men, machine and materials and provide a mathematical model to represent complex functional relationships.
- To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like Strategies formulation with the help of game theory, PERT and CPM etc.

Prerequisite(s): Basic knowledge of differentiation & integration of functions, vector algebra, determinants & matrices and calculus of finite difference.

COURSE OF CONTENTS

UNIT I

Non-Linear Programming: Kuhn Tucker conditions, Quadratic and Convex Programming. Dynamic Programming; Characteristics, Dynamic programming approach, Optimal subdivision problem.

UNIT II

Information Theory: Basic ideas, Mathematical definition of information, Measure of uncertainty and properties of entropy function, Communication system, joint and conditional entropies, Channel Capacity, Efficiency and redundancy Encoding, Shannon Fano Method.

UNIT III

Basic steps in PERT and CPM, PERT computation, CPM computation, critical path, Float, Cost analysis, Crashing the network, Contracting, Updating, Resource Scheduling, application of Network Techniques.

UNIT IV

Game theory-Maxmin-minimax criterion, Two persons zero sum games, Games with Mixed Strategies, Dominance Property, Graphical solution of two persons game, Matrix Game and its Relation with Linear Programming,

UNIT V

LP solutions of bidding models, N-person Non-zero sum games, Cooperative Games.

Learning Outcomes:

On completion of this course you should be able to:

- Know the various strategies required in business decisions using game theory.
- Know the project implementation and control techniques using network analysis.
- Understand how to model and solve problems using dynamic programming.
- Learn optimality conditions for single- and multiple-variable unconstrained and constrained nonlinear optimization problems, and corresponding solution methodologies.

BOOKS RECOMMENDED:

1. Hillier, F. S. and Lieberman, G. J. – Introduction to Operation Research, 8th Ed., New York, McGraw- Hill, 2005.
2. Taha, H. A. – Operations Research: An Introduction, 7th ed., Macmillan Publication Co., 2003.
3. Sharma, S.D. – Operations Research, Kedarnath Ramnath & Co., Meerut, 2004.
4. Dantzig G., Thapa M. Linear programming 1: Introduction, Springer, 1997.
5. P K Gupta & D S Hira, Operations Research, S. Chand., 2008.
6. J.K. Sharma, Operations Research: Theory and Application, 3rd Ed., Macmillan, 2006.
7. E. N. Barron. Game Theory: An Introduction, 2nd Edition, John Wiley & Sons, Inc., 2013.
8. Y. Narahari. Game Theory-Lecture Notes, Department of Computer Science and Automation Indian Institute of Science Bangalore, India, 2012.
9. Martin J. Osborne, Ariel Rubinstein. A Course in Game Theory. Cambridge, MA: MIT, 1994.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4EM2: Mathematical Modelling	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide rigorous instruction in fundamental mathematical concepts and skills presented in the context of real-world applications.
- Gain a working knowledge of core techniques behind mathematical modelling and develop a basic ability to quantify certain phenomena associated with the physical sciences.
- Represent real-world systems in a mathematical framework..

Prerequisites: Basics of algebra, differential equation, difference equations and graphs.

COURSE OF CONTENTS

UNIT I

Concept of models: Types of models- Iconic, analogue and symbolic models, Classification of models, Meaning and formulation of mathematical models, example.
Mathematical modeling through algebra: Retail pricing model, Student assessment problems, Electricity tariff model, EOQ model for inventory control.

UNIT II

Mathematical Modelling through Ordinary Differential Equations of First order: Linear Growth and Decay Models – Non-Linear Growth and Decay Models – Compartment Models – Dynamic problems – Geometrical problems. Population Dynamics – Epidemics – Compartment Models. Domar's macro model; Domar's debt model

UNIT III

Mathematical Modelling through Ordinary Differential Equations of Second Order: Planetary Motions – Circular Motion and Motion of Satellites – Mathematical Modelling through Linear Differential Equations of Second Order – Miscellaneous Mathematical Models. Samuelson's capital Investment model, Philips stabilization model for closed economy.

UNIT IV

Mathematical Modelling through Difference Equations: Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics – Probability Theory. Models based on

linear difference equations -Cobweb model, Harrod Domar growth model, Consumption model, Samuelson's multiplier- accelerator model.

UNIT V

Mathematical Modelling through Graphs: Solutions that can be Modelled Through Graphs – Mathematical Modelling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Unoriented Graphs.

Learning Outcomes:

Upon completing the course, students will be able to:

- To create mathematical models of empirical or theoretical phenomena in domains such as the physical, natural, or social science.
- Draw inferences from models using mathematical techniques including problem solving, quantitative reasoning, and exploration using multiple representations such as equations, tables, and graphs;
- Not only take an analytical approach to problems but also use computer programming and statistical analysis skills to efficiently model systems.

BOOKS RECOMMENDED:

1. J.N. Kapur, Mathematical Modelling, New Age International, 1988.
2. Martin Brann C.S Coleman, DA Drewc (Eds) differential equation models.
3. C.L. Liu, Elements of Discrete Mathematics, McGraw-Hill Education, 2nd ed., 1986.
4. Edward A. Bender, Introduction to Mathematical Modelling, Dover Publications, 1st ed., 2000.
5. D.N. Burghes, A.D. Wood, Mathematical Models in the social, management, and life sciences, New York: Halsted Press, 1980.
6. Zafar Ahsan, Differential Equations and Their Applications, 2nd Ed., Prentice-Hall of India Pvt. Ltd, 2004.
7. Michael D Alder, An Introduction to Mathematical Modelling, HeavenForBooks.com, 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				MSc – II Year (Applied Mathematics) with Specialization in Computing & Informatics Semester- IV			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
AM4EM3: Number Theory/ Cryptography	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- The course aims to give elementary ideas from number theory which will have applications in cryptography.
- Identify and apply various properties of and relating to the integers including the Well-Ordering Principle, primes, unique factorization, the division algorithm, understand the concept of a congruence,
- To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

Prerequisites: Set theory, algebra of functions.

COURSE OF CONTENTS

UNIT I

Divisibility and Euclidean algorithm, congruences, applications to factoring.

UNIT II

Finite fields, Legendre symbol and quadratic reciprocity, Jacobi symbol.

UNIT III

Cryptosystems, diagraph transformations and enciphering matrices, Symmetric key cryptosystem, traditional techniques, Key range and size, Deffie-Hellman key exchange, various types of attacks, algorithm types and modes, various symmetric key algorithms (DES, IDEA, RC5, Blowfish)

UNIT IV

Asymmetric key cryptography, concept, RSA algorithm, digital envelope, concept of message digest, MD5 algorithm, Authentication requirements, Digital signatures, message authentic codes, Knapsack algorithm.

UNIT V

Primality and Factoring, Pseudoprimes, Carmichael number, Primality tests, Strong Pseudoprimes, Monte Carlo method, Fermat factorization, Factor base, Implication for RSA, Continued fraction method. Elliptic curves - basic facts, Elliptic curve cryptosystems.

Learning Outcomes:

Upon completing the course, students will be able to:

- Solve problems in elementary number theory.

- Apply elementary number theory to cryptography.
- Develop a deeper conceptual understanding of the theoretical basis of number theory and identify how number theory is related to and used in cryptography.

BOOKS RECOMMENDED:

1. Neal Koblitz, A Course in Number Theory and Cryptology, Graduate Texts in Mathematics, Springer, 1994.
2. Williams Stallings, Cryptography & Network Security, Pearson Education 3rd edition, 2004.
3. Atul Kahate, Cryptography & Network Security, Tata McGraw Hill, New Delhi, 2005.
4. Thomas Koshy, Elementary Number Theory with Applications, Academic Press, 2007.

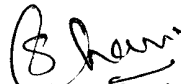
Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 24/06/2017

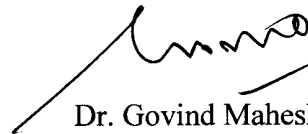
1. Departmental Committee members recommended the attached Academic calendar for 2017-18.
2. Department heads presented the syllabus and scheme of 5th Sem. Committee has approved the syllabus and scheme of 5th Sem, after thorough discussion, for following branches of BE, BE (Part Time- Mechanical), ME (Part Time);
 - BE Mechanical Engineering
 - BE Computer Engineering
 - BE Electronics & Instrumentation Engineering
 - BE Information Technology
 - BE Electronics & Telecommunication Engineering
 - BE Civil Engineering
 - ME Computer Engineering with specialization in *Software Engineering*
 - ME Information Technology with specialization in *Information Security*
 - ME Electronics Engineering with specialization in *Digital Instrumentation*
 - ME Electronics Engineering with specialization in *Digital Communication*
 - ME Industrial Engineering & Management
 - ME Mechanical Engineering with specialization in *Thermal & Design Engineering*



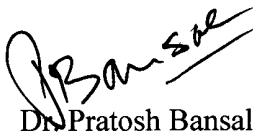
Dr. Paresh Atri



Dr. Nagendra Sohani



Dr. Govind Maheshwari



Dr. Pratosh Bansal



Dr. Ashesh Tiwari



S.V. Tokekar
24-06-2017

Dr. Sanjiv Tokekar

COURSE SCHEME FOR B.E III YEAR-FULL TIME (CBCS)

MECHANICAL ENGINEERING DEPARTMENT

Semester-V

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	MER5C1	DYNAMICS OF MACHINES	PC	3-1-1	4+1(P)
2	MER5C2	MACHINE DESIGN - I	PC	3-1-0	4
3	MER5C3	HEAT TRANSFER	PC	3-1-1	4+1(P)
4	MER5C4	I.C. ENGINES & JET PROPULSION	PC	3-1-1	4+1(P)
5	MER5G1	PRODUCTION ENGINEERING - I	GE	3-1-0	4
6	SMR5S5	PRINCIPLES & PRACTICES OF MANAGEMENT	--	2-0-0	2
7	MER5L3	WORKSHOP/PRACTICAL (Machine Design - I)	--	0-0-1	1(P)
8	MER5V5	COMPREHENSIVE VIVA -V	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions			Credits			
	Hours per Week			L	T	P	Total
MER5C1	L	T	P	L	T	P	Total
DYNAMICS OF MACHINE	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hrs							

Learning Objectives:

- 1 To make students to understand the concept of development of forces in various machines/mechanisms.
- 2 To develop the understanding of the effects and their consequences on mechanism / machines.
- 3 To make them able to determine this forces and to develop the various methods to counter this forces.

Prerequisite(s):

- Theory of Machines, Strength of Materials, Applied Mathematics.

COURSE CONTENTS

UNIT-I

Friction in Screw threads: Screw Frictions and Screw jack.

Friction in Bearings: Pivot and Collar Bearings, Journal Bearings, Thrust Bearings, Ball and Roller Bearings.

Friction in Clutches: Single & Multi-plate Clutch, Cone clutch, Centrifugal Clutch.

Friction Drives: Belt, Rope and Chain Drives

UNIT-II

Brakes: Introduction, Classification and Types of Brakes, Shoe/Block Brake, Band Brake, Band and Block Brake, Internal Expanding Shoe Brake, Disc Brake. **Dynamometer:** Introduction, Classification and Types of Dynamometers. Propulsions and Breaking of Vehicle

UNIT-III

Dynamic Force Analysis: Inertia Force and Inertia Torque, D. Alembert's Principle.

Dynamic Analysis in Reciprocating Engines: Gas Forces, Equivalent masses, Piston Efforts, Crank shaft Torque, Turning moment diagrams, Fly wheels, fluctuation of energy and speed.

UNIT-IV

Governors: - Introduction, Types and Classifications, Centrifugal Governors, Gravity Controlled and Spring Controlled Governors, Inertia Governors, Governor Characteristics and Effect of friction.

UNIT-V

Balancing of Rotating Masses: Static and Dynamic Balancing, Balancing a Single Cylinder Engine, Balancing Multi-Cylinder Engines

Balancing of Reciprocating Masses: Primary and Secondary Balancing, Locomotive Balancing, Hammer Blow, Pitching and Swaying Couples, Conditions of Balance in V-Engine, Radial

Engine and Multi-Cylinder in line Engines.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Determine the Forces and Torques due to Friction in Bearings, Clutches and Belt Drives.
- Determine the Forces and Torques due to Friction in Brakes and Vehicle Propulsion.
- Determine the Forces and Torques in Reciprocating Engines.
- Determine the Forces and Torques in Governor Mechanisms.
- Determine the unbalancing Forces / Torques in Engines and Machines and to balance this Forces/Torques.

BOOKS RECOMMENDED:

- [1] Rattan S.S., *Theory of Machines*, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Reprint 2005.
- [2].Shigley J.E. and Uicker J.J., *Theory of Machines and Mechanisms*, McGraw Hill, Inc., 1995.
- [3].Thomas Bevan, *Theory of Machines*, CBS Publishers and Distributors, 1984.
- [4].Ghosh A. and Mallick A.K., *Theory of Mechanisms and Machines*, Affiliated East-West Press Pvt.Ltd., New Delhi, 1988.
- [5].Rao J.S. and Dukkipati R.V., *Mechanism and Machine Theory*, Wiley-Eastern Limited, New Delhi, 1992.
- [6].John Hannah and Stephens R.C., *Mechanics of Machines*, Viva low-Priced Student Edition, 1999.

LIST OF PRACTICAL ASSIGNMENTS

1. To determine the coefficient of friction between the surfaces of different materials by inclined plane method.
2. To determine coefficient of friction between leather belt and CI pulley by Simple & differential band brake method.
3. To determination the coefficient of friction between leather belt and wooden pulley by belt and pulley apparatus.
4. To determine the pressure distribution in the oil film of the journal bearing for various speeds and plot the curves, determine total load and tractive torque.
5. To determine the moment of inertia of objects using trifilar suspension method.
6. To determine the moment of inertia of connecting rod by compound pendulum method.
7. To determine characteristic curves of
 - a) Speed v/s sleeve displacement.
 - b) Controlling force v/s radius of rotation of the ball center, for Watt, Porter, Proell and Hartnell type governors.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER5C2							
MACHINE DESIGN I	3	1	0	3	1	0	4
Duration of Theory Paper: 4 Hours							

Learning Objectives:

1. To introduce the students about the concept and importance of the design (A decision making)
2. To give the concept about the theories of failures and importance of material's selection in design
3. To give the concepts about the design of basic mechanical components like springs, rotating elements etc.

Pre requisite(s):

- Theory of Machines, Strength of Materials, Material Science.

COURSE CONTENTS

UNIT-I

Theory of Failures & Applications

Theories of failure, their applications to the design problems, Design of parts subjected to torsional and/ or bending such as spiral, helical and leaf springs.

UNIT-II

Pressure Vessels and Cover Plates

Analysis of thick cylindrical and spherical shells, compound cylinders, joint for steam and hydraulic pipes, parts of press fit and shrink fit, design consideration of pressure vessels and cover plates.

UNIT-III

Rotating Rings and Disks

Disk of uniform thickness and disk of uniform strength. Effect of drilled hole and extra mass, design of flywheel and pulleys.

UNIT-IV

Design Analysis of Curved Machine Members

Crane Hook, Chain link, open and closed links, M/c. Frames, Wall brackets, design and selection of hooks and wire ropes.

UNIT-V

Experimental Methods in Design

Brief idea about experimental stress analysis techniques and their applications and limitation.

Learning Outcomes:

After Completing the Course, Student will be able to:

- Have the importance, role and concept of design
- Learn to apply the knowledge of material science in real life situations.
- Design the basic machine elements like spring, cylinder etc.
- Know about the latest stress analysis techniques

BOOKS RECOMMENDED:

- [1] Spotts M.F., Shoup T.E., Hrnberger L.E., Design of Machine Elements, Pearson Education, 8e, 2006
- [2] Sharma P.C. & Aggarwal D.K., Machine Design, S.K. Kataria & Sons, 11e, 2006
- [3] Shariff A., Design of Machine Elements, Dhanpat Rai Publications(P) Ltd., 3e, 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
MER5C3 HEAT TRANSFER	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hrs	3	1	2	3	1	1	5

Learning Objectives:

- To make a fundamentally strong base theory of heat transfer.
- To understand different modes of heat transfer.
- To model and simulate heat transfer phenomenon.
- To extend the theory of heat transfer equipment.

Prerequisite(s):

- Fluid Mechanics, Engineering Thermodynamics, Applied Mathematics.

COURSE CONTENTS

UNIT- I

Steady State Heat Conduction: One Dimensional Heat Conduction Equation, General Heat Conduction Equation, Heat Conduction in Cylinders and Spheres, Heat generation in Plane wall and cylinders, Variable Thermal Conductivity, Thermal Contact Resistance, Illustrative Problems

UNIT- II

Heat Transfer from Extended Surfaces and Transient Heat Conduction: Steady flow of heat along a rod, Governing differential equations and its solutions, Heat dissipation from infinitely long fin, Heat dissipation from fin having insulated tip, Fin performance, Critical Radius of Insulation, Lumped System Analysis, Transient Heat Conduction in Large Plane Walls and Long Cylinders, Illustrative Problems

UNIT- III

Fundamentals of Convection: Physical Mechanism on Convection, Velocity Boundary Layer and Thermal Boundary Layer, Derivation of Differential Convection Equation, Natural Convection over Surfaces, Natural Convection from Finned Surfaces and PCBs, Forced Convection across Cylinders, Spheres and Tube Banks, Combined Natural and Forced Convection.

UNIT-IV

Fundamentals of Thermal Radiation: Introduction, Radiative Properties, View Factor Relations, Radiation Heat Transfer, Radiation Shields and the Radiation Effects.

UNIT- V

Heat Exchangers: Classification of Heat Exchangers, Nature of Heat Exchange process, Mechanical design of heat exchange surfaces, Performance analysis, Overall heat Transfer Coefficient, Effectiveness-NTU method, Cooling of Electronic Equipments, Illustrative Problems.

Learning outcomes:

Upon Completing the Course, Student will be able to:

- List and Tabulate the Temperature Measuring Devices.
- Determine the thermal conductivity of an insulating powder.
- Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
- Effectiveness and efficiency of pin fin by using pin fin apparatus
- Determine and verify the value of Stefan Boltzmann constant experimentally..
- Determine the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger.
- Determine the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchange

BOOKS RECOMMENDED

- [1] Cengel YA., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e, 2002.
1. Rudramoorthy R. *Heat Transfer-Theory and Problems*, Pearson Education, New Delhi, 2006
 2. Christopher A, *Essential Heat Transfer*, Pearson Education, New Delhi, 2001.
 3. Nag, P.K., *Heat Transfer*, Tata McGraw Hill, New Delhi, 1e, 2006.

LIST OF PRACTICAL ASSIGNMENTS

1. List and Tabulate the Temperature Measuring Devices
2. To determine the thermal conductivity of an insulating powder
3. To Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
4. To determine the Effectiveness and efficiency of pin fin by using pin fin apparatus
5. To Determine and verify the value of Stefan Boltzmann constant experimentally
6. Determining the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger
7. Determining the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchanger.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions			Credits			
	Hours per Week			L	T	P	Total
MER5C4: IC ENGINES AND JET PROPULSION	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To make students to understand principal and working of Engines and Turbines

1. To develop the understanding of the effects of fuel combustion on environmental pollution.
2. To make students to understand principal and working of different systems used in IC Engines and Jet Propulsion.
3. To make them able to understand the testing performance parameters and various testing methods to determine these parameters of IC Engines and Jet Propulsion.
4. To understand the latest trends in IC Engines.

Pre requisite(s):

- Applied Thermodynamics, Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT-I

Introduction to I.C. Engine & Fuels

Air standard cycles, Otto, Diesel, Stirling, Ericsson cycles, Engine classification- Two and four stroke-SI and CI engines, Stirling engine, Rotary engines, Stratified charge engine, Variable compression ratio engine. Valve timing diagram, Fuels: Fuels for SI and CI engine, important qualities of SI engine fuels, important qualities of CI engine fuels, dopes, additives, gaseous fuels, LPG, CNG, biogas, alternative fuels.

UNIT-II

SI Engine

Carburetion, mixture requirements and thermochemistry of petrol fuel, Carburetor types, theory of carburetor, Calculation of air /fuel ratio supplied by carburetor, MPFI System (petrol injection). Combustion in SI engine, flame Speed, ignition delay, abnormal combustion and its control, combustion chamber design for SI engines. Ignition system requirements, battery ignition systems, magneto ignition system, electronic ignition system, ignition timing, firing order and spark plugs, variable valve control- VVC, VVA, VVE, VVS VTC, VTEC, VTEC-E, i -VTEC, AVTEC, SI Hybrid Engine.

UNIT-III

CI Engine

Requirements of Fuel injection in CI engines, types of diesel fuel injection systems (Mechanically controlled and electronically controlled), fuel pumps, fuel injectors, injection Timings. Fuel injection computation in CI Engines, Combustion in CI engines, ignition delay, knock and its control, combustion chamber design of CI engines. Scavenging in 2 stroke engines.

UNIT-IV

Engine Cooling, Lubrication, Supercharging & Testing

Engine Cooling: Different cooling systems, radiators and cooling fans, Lubrication: Total Engine friction, lubrication principle, lubricating oils, type of lubricating systems,
Testing and Performance: Performance parameters, basic measurements, testing of SI and CI engines and calculation of performance parameters.

Supercharging: Effect of altitude on power output, Types of supercharging and turbocharging and effects on engine performance.

New Technologies of Engines- **Cylinder Deactivation**, Camless engines, DI Turbo Ethanol engine, KERS, HCCI, OPOC, and IC Engine with oscillating shaft.

UNIT-V

Compressors, Gas Turbines & Jet Propulsion

Dynamic Compressors- Centrifugal compressor and Axial Flow Compressor- elementary theory, vector diagram efficiencies, and performance analysis and curves, Losses in dynamic compressors, surging and stalling,

Gas Turbines: Introduction, Classification and Application, Gas turbine main components, , Optimum pressure ratio for maximum specific output and thermal efficiency in actual gas turbine cycle, Air rate and work ratio, Open cycle Gas turbine with Regeneration , Reheat and Intercooling, Effect of operating variables on thermal efficiency.

Jet Propulsion- Turbo jet, Turbo fan, Turbo Prop, Ram jet, Rocket engines, thrust power, propulsive efficiency and thermal efficiency, Jet propulsion performance, Specific thrust and specific fuel consumption in each case for turbo jet and turbo propulsion units.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Determine the air fuel ratio supplied by carburettor and MPFI system.
- Determine the thermochemistry of fuels.
- Design and select the combustion chambers of SI Engines.
- Draw the valve timing diagram of SI Engines(Two and Four Stroke).
- Determine the Torque/Mean effective pressure / BHP/FHP/IHP/volumetric efficiency/Brake thermal efficiency/Specific fuel consumption and other parameters of engines.
- Determine the performance parameters of Centrifugal compressors, gas turbine, air crafts and rocket engines.

BOOKS RECOMMENDED

- [1] Mathur & Sharma, "*Internal combustion Engines*", Dhanpat Rai Publications, 2007.
- [2]. Ganeshan V "*Internal Combustion Engines*", Tata Mc Graw Hill Publication, 1992.
- [3]. Heywood J. B, "*Internal Combustion Engine Fundamentals*", Mc Graw Hill, 1988.
- [4]. Khajuria P.R., Dubey S.P., *Gas Turbines & Propulsive Systems*, Dhanpat Rai Pub, 2005
- [5]. Sarvanamatto, Cohen H, Rogers, "*Gas Turbine Theory*", Longmans Green, 1996
- [6]. Yahya S. M., "*Turbines, Compressors and Fans*", Tata McGraw Hill Publications, 1996
- [7]. Dr. R. Yadav, "*Steam and Gas Turbines*", Central publishing House, 2015
- [8]. Dr. R. Yadav, *Applied Thermodynamics*, Central Publishing House, 2012
- [9]. Ganesan V. *Gas Turbines*, Tata McGraw Hill Publications, 1999

LIST OF PRACTICAL ASSIGNMENTS

To Study of carburettor, Induction system and combustion chamber in petrol engine

1. To study of MPFI systems and performance testing on MPFI SI engine.
2. To study of fuel injection systems and its components in diesel engines.
3. To study the Battery ignition system, Magneto ignition system and Electronic ignition system
4. To Study of Water Brake Dynamometer with Four Stroke Four Cylinder S. I. Engine.
5. Performance testing of Four Stroke Four Cylinder S. I. Engine
6. To Study of Swinging Field Electrical Dynamometer with twin cylinder Four Stroke Diesel

7. Performance testing of Four Stroke Four Cylinder C. I. Engine.
 8. To Study of Engine Cooling and Lubrication Systems.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER5G1	L	T	P	L	T	P	Total
PRODUCTION ENGINEERING - I	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide an understanding of the design features of the machine tools and the types tooling used in the manufacturing of mechanical components.
2. To learn about the various sheet metal processes and the equipments and tooling used to produce sheet metal parts.
3. To learn about the DFMA approach and methodologies
4. To learn about the basics of production systems and automation in production systems.

Pre requisite(s):

- A basic course in manufacturing processes and workshop practice.

COURSE CONTENTS

UNIT-I

Fundamentals of Machine Tools

Introduction and classification of machine tools, requirements and characteristics of machine tools, elements of machine tool structure: beds, columns and frames, slides and sideways, spindles and spindle bearings, machine tool drives, machine tool testing, maintenance and safety.

UNIT-II

Tooling for Machine Tools

General tooling for machine tools, jigs-fixtures: locating and clamping, principles of jigs and fixture design, design of drilling jigs, drill jig bushes and type of jigs ; milling fixtures, lathe fixtures, grinding fixtures, broaching fixtures, assembly fixtures, automated jigs and fixtures, materials for jigs and fixtures and jigs & fixture economics.

UNIT-III

Sheet Metal Working & Press Tools

Introduction to sheet metal forming, forming limit diagram, basic operations on sheet-metal, press working equipment & press selection, components of a die assembly, types of dies, die and punch clearances, forces and power requirements, center of pressure, blanking die design, piercing die design, pilots, drawing dies, bending dies, design considerations and defects in sheet-metal parts, materials & manufacture of sheet metal working dies.

UNIT-IV

Design for Manufacture & Assembly

Role of processing in design, factors determining process selection, Design for Manufacturability (DFM), Design for Assembly (DFA), product design considerations for

machining, casting, forging, welding, plastic and composite parts. Design evaluation: minimum part assessment, robustness assessment, design for reliability, failure mode-effect analysis, value analysis, development of modular design and design for safety.

UNIT-V

Production systems and automation

Types of production systems, review of production concepts and mathematical models, reasons for automation, automation strategies and levels of automation, automation for machining operations, design and fabrication considerations, automated flow lines, methods of workpart transport and transfer mechanisms, assembly systems, types and design considerations for the automated assembly systems, types of material handling equipment, design considerations for material handling system, conveyor systems, automated guided vehicle systems(AGV's).

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Understand the design features of the machine tools and tooling like jigs-fixtures and select them appropriately for different production processes and environments.
- Understand the basic processes and set-ups used to produce sheet metal parts.
- Understand some of the contemporary design methodologies used for the design and manufacture of parts.
- Learn about basics of production systems and automation in materials handling and assembly systems.

BOOKS RECOMMENDED:

- [1]Sharma P. C., *A text Book of Production Engineering*, S. Chand Publishing ,11ed,1982.
- [2].Pandey PC & Singh CK, *Production Engineering and Science*, Standard Pub. & Distr. 2011.
- [3].Dieter E. George, Schmidt Linda, *Engineering Design*, McGraw-Hill Education,5ed, 2012.
- [4].Rao P.N., *Manufacturing Technology, Vol-1, Vol-2*, McGraw-Hill Education,2017
- [5].Groover Mikell P. *Automation, Production Systems & Computer Integrated Manufacturing*, PHI Learning Pvt Ltd.3ed, 2015.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER5L3							
Workshop/Practical (MACHINE DESIGN – I)	0	0	2	0	0	1	1

Learning Objectives:

1. To solve the Practical based problems for the designing the Mechanical Components.
2. To introduce the market survey practice to the students.
3. To develop the practice for literature survey to the students.
4. To prepare the students to work in a team.

Pre requisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

1. Problem based on theory of failure.
2. Problem on Design for Helical Spring.
3. Problem on Design for Leaf Spring.
4. Problem on Design for Pressure Vessels
5. Problem on Design for Pipe Joints.
6. Problem on Design for Rotating Disc
7. Problem on Design for Flywheel.
8. Problem on Design for Pulleys.
9. Problem on Design for Crane Hook.
10. Problem on Design for Chain Drive

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Get the practical knowledge of designing the various components of Internal Combustion Engine.
- Learn the market survey practice.
- Get practice of literature survey.
- Learn to work in a team.

BOOKS RECOMMEDED:

- [1] Shigley J.E., Mechanical Engineering Design, McGraw-Hill 2015.
- [2] Spotts M.F., Shoup T.E., Hrnberger L.E., Design of Machine Elements, Pearson Education ,8e,2007.
- [3] Sharma P.C. & Aggarwal D.K., Machine Design, S.K.Kataria & Sons,11e,2013
- [4] Bhandari V.B., Design of Machine Elements, McGraw-Hill, 4e,2017.
- [5] Black and Adams, Machine Design, Mc.Graw Hill,1968.
- [6] Maleev V.L., I.C.Engine Design, Mc.Graw Hill ,1945.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SMR5S5	L	T	P	L	T	P	Total
PRINCIPLES & PRACTICE OF MANAGEMENT	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide engineering students with an accelerated introduction to the basics of management and the language of business.
2. To provide a basis of understanding to the students with reference to working of Business Organizations through the process of Management.
3. To inculcate the managerial skills and to teach how it can be executed in a variety of circumstances.

Pre requisite(s): Nil

COURSE CONTENTS

UNIT-I

Introduction to Management and Organization

Basic concepts of management- definition, principles , levels and functions of management; Managerial roles and skills; Organization- meaning, types, business environment, efficiency and effectiveness.

UNIT-II

Planning: Nature and purpose of planning

Types of planning, planning process, forecasting; Objectives- setting objectives, types of objectives; Decision making.

UNIT-III

Organizing and Staffing

Organization chart, Organization structures, departmentalization, span of control, delegation of authority- centralization and decentralization; Informal organization; process of Staffing.

UNIT-IV

Directing

Direction- meaning, process and components; motivation- theories of motivation; leadership- types and theories of leadership; communication- process, barriers and types.

UNIT-V

Controlling

Meaning and process of managerial control, techniques of control evaluation- budgetary and non-budgetary control techniques; Use of computers and IT in management

Learning Outcomes:

At the end of the course, students should be able to do the following:

1. Identify the key management processes and the relevance of management in organisations.
2. Understand the key management skills required in organisations and how these might be applied.
3. Evaluate their own managerial skills and the ways in which these might be developed.

BOOKS RECOMMENDED:

- [1]. Agrawal R.D, *Organization & Management*.1/E PHI 1997.
- [2]. Tripathy PC And Reddy PN, *Principles of Management*, Tata McGraw-Hill, 5th Edition, 2012.
- [3]. Dinkar Pagare, *Principles of Management*, Sultan Chand & Sons, 2000.
- [4]. G.K.Vijayaraghavan and M.Sivakumar, *Principles of Management*, Lakshmi Publications, 5th Edition, 2009.

COURSE SCHEME FOR B.E III YEAR-FULL TIME (CBCS)

Semester-V

COMPUTER ENGINEERING DEPARTMENT

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	CER5C1	THEORY OF COMPUTATION	PC	3-1-0	4
2	CER5C2	SOFTWARE ENGINEERING	PC	3-1-1	4+1(P)
3	CER5C3	COMPUTER NETWORKS	PC	3-1-1	4+1(P)
4	CER5EX	--	PE	3-1-1	4+1(P)
5	CER5G3	OBJECT ORIENTED ANALYSIS AND DESIGN	GE	3-1-0	4
6	CER5L3	SOFTWARE LAB	--	0-0-1	1
7	SCR5S5	ENGINEERING LEADERSHIP- I	--	2-0-0	2
8	CER5V5	COMPREHENSIVE VIVA-V	Virtual L	0-0-4	4
TOTAL CREDITS					30

1	CER5E1	SERVER SIDE PROGRAMMING	PE	3-1-1	4+1(P)
2	CER5E2	SOFTWARE VULNERABILITIES AND SECURITY	PE	3-1-1	4+1(P)
3	CER5E3	METHODS OF SOFTWARE DEVELOPMENT	PE	3-1-1	4+1(P)
4	CER5E4	EMBEDDED SYSTEM	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
CER5C1 THEORY COMPUTATION	OF	L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

1. Course should provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (abstract) view towards algorithmic design and in general computation itself.
2. The course should in addition clarify the practical view towards the applications of these ideas in the engineering part as well.

Prerequisite:

- Students should have a background in discrete mathematics, data structures, and programming languages.

COURSE CONTENTS

UNIT-I

Finite Automata and Regular Languages

Motivation for studying theory of computation, Notion of formal languages and grammars, Kleene's Closure, Regular Expressions and Regular languages, closure properties of regular languages, Finite Automata. Finite Automata with output: Mealy and Moore machines, applications.

UNIT-II

Nondeterminism and Minimization

Nondeterministic Finite Automata, Acceptance condition. Kleene's Theorem, Myhill-Nerode relations, Minimization Algorithm, Non-Regular languages, Pumping Lemma for regular languages.

UNIT-III

Grammars and Context-Free Languages

Grammars and Chomsky Hierarchy, Context-Free Grammars, Context-Free Languages (CFLs), Inherent Ambiguity of CFLs, closure properties of CFLs, Eliminating useless symbols; null-productions; and unit productions, Chomsky Normal Form, Greibach Normal Form, Cock-Younger-Kasami (CYK) Algorithm, Applications to Parsing.

UNIT-IV

Pushdown Automata

Pushdown Automata (PDAs), PDAs vs CFLs. Deterministic PDAs and CFLs, applications, notion of acceptance for PDAs: acceptance by final states, and by empty stack; the equivalence of the two notions, Proof that CFGs generate the same class of languages that PDAs accept, Pumping Lemma for CFLs.

UNIT-V

Turing Machines and Computability

Introduction to Turing Machines, Configurations, Halting vs Looping, Turing computability, Nondeterministic, multitape and other versions of Turing machines. Church's thesis, Universal Turing Machines, Linear Bounded Automata (LBAs) and context-sensitive languages, Recursive and Recursively enumerable languages, Undecidability of Halting Problem and unsolvable problems about Turing Machines, the diagonalization language and proof that it is not Recursively enumerable.

Learning Outcomes:

After completing the course, the student will be able to:

- Model, compare and analyse different computational models.
- Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
- Identify limitations of some computational models and possible methods of proving them.
- Have an overview of how the theoretical study in this course is applicable to an engineering application like designing the compilers.
- Have an understanding of the solvable and unsolvable problems and their computational behaviors.

BOOKS RECOMMENDED:

- [1] Daniel I.A. Cohen, Introduction to Computer Theory, John Wiley, 1990
- [2] John C. Martin, Introduction to Languages and the Theory of Computation, 3/e Tata McGraw Hill, 2005
- [3] J.E. Hopcroft and J.D. Ullman, Introduction to Automata, Languages and Computation, Narosa Publishing House, 1995
- [4] J.E. Hopcroft, Rajeev Motwani and J.D. Ullman, Introduction to Automata, Languages and Computation, Pearson Education, Asia, 2002
- [5] H.R. Lewis and C.H. Papadimitriou, Elements of the Theory of Computation, Prentice Hall Inc., 1999
- [6] M. Sipser, Introduction to the Theory of Computation, Brooks/Cole Thomson Learning, 1996
- [7] Zohar Manna, Mathematical Theory of Computation, McGraw Hill, 1997

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5C2 SOFTWARE ENGINEERING	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objective:

1. To familiarize with the process of software development life cycle using the concepts of software engineering.

Prerequisite:

- Knowledge of a programming language, preferably object oriented and Mid-size project work.

COURSE CONTENTS

UNIT I

Software Engineering process- Basic concepts of System Design, System :Technical and Socio Technical System, Legacy System, Layered Technology, Software Process Model: Water Fall Model, Prototype Model, Incremental Model, Spiral Model, Agile Model, Role of Software Engineer, Software Qualities and nature requirements and Measurement, Technique; other Software Engineering issues like formality, modality, abstraction, reuse, generality etc.

UNIT II

Critical System, UML, Software Process: Rational Unified Process, Software Requirements, Requirements Analysis and Principles, Requirement Engineering Process, SRS, SDS, End-user requirements, Design Modularity Design, object-orientation

UNIT III

Software Design Process: Design principles, Design Concept: Analysis Model, Design Model, Modularity, Design Methods: Data Design, Architecture Design, Interface Design, Verification goods and Requirement – Testing, Debugging Analysis, Analysis software.

UNIT IV

Software Testing Fundamentals, Black Box Testing, White Box Testing, Other Testing Methods ,Cohesion and Coupling, Verification and Validation ,Case Studies Software Engineering, Management planning control, Organization and Risk Management.

UNIT V

Software Engineering Tools – System programs, Role of Programming languages; CASE Tools; Objected Oriented software Engineering; format Methods; Reengineering process, Client Server Software Engineering.

Learning outcomes:

- How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
- An ability to work in one or more significant application domains
- Work as an individual and as part of a multidisciplinary team to develop and deliver quality software

- Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
- Demonstrate an ability to use the techniques and tools necessary for engineering practice

BOOKS RECOMMENDED:

[1] C.Gezzi, M. Jazayeri and D. Mandriohi Fundament of software Engineering, PHI 1996.

[2] R.S. Pressman, software Engineering A Practitioner Approach, 4/e McGraw-Hill
International Edition 1997.

[3] P.Jalote, An Integrated Approach to Software Engineering, Naresa Publishing, Latest Edition.

[4] Ian Sommerville, Software Engineering, Pearson education, 7th edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology) (Full Time)			
Subject Code & Name		Instructions Hours per Week		Credits			
CER5C3		L	T	P	L	T	P
COMPUTER NETWORK		3	1	2	3	1	1
Duration of Theory Paper: 3 Hours							Total
							5

Learning Objectives:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Pre requisites: Basic knowledge of programming, Data Structures and Object Orient Programming

COURSE CONTENTS

UNIT I

Introduction

Definition and goals, Design issues, Network architecture-broadcast & point to point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN, WAN & MAN, protocols & services, types of service-connection oriented and connectionless, different protocols.

Transmission Media: Twisted Pair, Coaxial cable, Fiber optic cable, Wireless transmission, telephone system, multiplexing, switching-circuit, packet & message switching, Virtual circuit switch.

Network devices-repeater, bridge, router, gateways, network interface cards, cabling system.

UNIT II

Data Link Layer

Framing, Error control-Bit Error, causes of error, control methods, Flow control: Stop & wait, sliding window concept, piggybacking.

Local Area Network Technology: Protocols- Aloha, CSMA, CSMA/CD, Collision free protocols, IEEE 802 protocols, standard- topologies, cabling system, Network management, MAC addressing frame format. Ethernet.

UNIT III

Network Layer

Introduction, features & design issues, Routing- different routing algorithms, congestion control, Internetworking- Concepts and architecture. Addressing-IP Addressing and subnet masking, IP protocols, Network Address Translation, Address resolution protocol (ARP).

UNIT IV

Transport Layer

Introduction, design issues, Transport layer addressing, buffering, multiplexing, recovery, TCP/IP suit of protocols- TCP & UDP Network applications, Connection establishment, Connection release, TCP Header.

UNIT V

Application Layer

Introduction to application layer, Application layer protocols: Electronic mail, File transfer, remote login, WWW, Multimedia etc. Firewalls.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

BOOKS RECOMMENDED

- [1] Computer Networks, Andrew. S. Tanenbaum, 4/e, Prentice Hall of India Private Ltd, 2003.
- [2].Data Communications and Networking, Behrouz A Forouzan, 4/e, Tata McGraw Hill Education Private Limited.
- [3].Data Communications & Networks, Achyut S. Godbole, Tata McGraw Hill Education Private Limited, 2002.
- [4].Data and Computer Communication, William Stalling, 7/e, Prentice Hall of India Private Ltd, 2007.

LIST OF PRACTICAL ASSIGNMENTS

During learning of course, students need to do assignments:

1. Study of various network devices in detail.
2. Study of basic network commands and network configuration commands.
3. Installation of LAN card.
4. Implementation of Bit Stuffing.
5. Implementation of Byte stuffing.
6. Implementation of error correcting codes.
7. Implementation of error detection codes.
8. Study of network IP.
9. Implementation of various routing protocols.
10. Programming with Sockets.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5G3 Object Oriented Analysis & Design	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To learn object oriented analysis, modeling and design using UML.
2. To learn object oriented approach of software engineering.

Prerequisite:

- Knowledge of object oriented programming and basics of software engineering.

COURSE CONTENTS

UNIT-I

Rational Unified Process, Process Notation, Introduction to UML, Business Modeling Workflow, Object Oriented Analysis: Requirements Overview, Problem Statement, Glossary, Supplementary Specifications, Analysis and Design Overview; Architectural Analysis overview, Use Case Analysis: finding classes from use case behavior, describe responsibility, attribute and association; qualify analysis mechanism.

UNIT-II

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT-III

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.
Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT-IV

Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, Events and signals, state machines, processes and Threads, time and space, state chart diagrams

UNIT-V

Architectural Modeling: Architectural Analysis: Analysis Mechanisms, Key Abstractions, Pattern, Initial Architectural Layers, Component, Deployment, Component diagrams and Deployment diagrams.

Learning Outcomes:

After successfully completing this course you will be able to:

- Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
- Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language

BOOKS RECOMMENDED:

- [1] Grady Booch, Object Oriented Analysis & Design with Application, Pearson Education India 2nd Edition.
- [2] Scott W. Ambler, The Object Primer, Cambridge University Press, 2nd Edition.
- [3] Philippe Kruchten, The rational Unified Processes & Introduction Pearson Education India 2nd Edition.
- [4] Grady Booch, James Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley
- [5] M. Blaha, J. Rumbaugh, Object Oriented Modeling and Design with UML, Pearson Education 2nd Edition, 2007.

LIST OF PRACTICAL ASSIGNMENTS

1. To develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identify the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5L3 SOFTWARE LABORATORY	L	T	P	L	T	P	Total
Duration of Practical: 2 Hours	0	0	1	0	0	1	1

Learning Objective:

1. To develop the skill set so that the students can develop software application using python on their own

Prerequisite:

- Programming Concepts.

COURSE CONTENTS

UNIT-I

Features of Python, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator, If, If- else, Nested if-else, For, While, Nested loops Break, Continue Accessing Strings, Basic Operations, Function and Methods.

UNIT-II

Introduction of Sqlite, Database connectivity, Accessing tuples , Executing queries, Transactions , Operations Working, Handling error Functions and Methods, Printing on screen Reading data from keyboard, Opening and closing file, Reading and writing files

UNIT-III

Graphics and GUI programming-Drawing using Tkinter and python. Networking and Multi-threaded programming –Sockets, Thread and Processes, Chat application.

UNIT-IV

Class and object. Attributes, Inheritance, Overloading, Overriding, Data hiding Regular expressions, Match function, Search function, Matching VS Searching, Modifiers, Patterns, CGI(Introduction, Architecture, CGI environment variable, GET and POST methods, Cookies, File upload.

UNIT-V

Web Frameworks - for developing server-side Web applications in Python, Web Browse Programming - interfacing with existing browsers and browser technologies.

Learning Outcome:

- After the completion of the course the student will be able to develop projects on their own and will try to relate them with the real life problems and this skill will help them for the development of project in next academic session as well as their analytic and research capability will be enhanced.

BOOKS RECOMMENDED:

[1] John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of india

[2] R. Nageswara Rao, "Core Python Programming", dreamtech

- [3] Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
- [4] Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley
- [5] Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication
- [6] Luke Sneeringer, “Professional Python”, Wrox
- [7] Hacking Secret Ciphers with Python”, Al Sweigart, URL-
<https://inventwithpython.com/hacking/chapters>

LIST OF PRACTICAL ASSIGNMENTS:

Students are given programming assignments to learn following.

1. How to take input through file/command line/ network.
2. Concept of Python List, Python String, Python Dictionary, Python Tuples and data type conversion.
3. Techniques of function calling, modules like import, from import etc.
4. Basic I/O functions and exception handling in Python.
5. Concept of object oriented programming, built in class attributes, regular expressions for pattern matching.
6. To work with database interfaces (Sqlite).
7. Concept of networking using Python
8. Web development using web framework flask, bootstrap.
9. Use of XML, CSS, HTML, AJAX to understand the concept behind the web browsing.
10. A project to be developed which uses the above concept.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
CER5P1 SERVER PROGRAMMING	SIDE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Learning Objectives:

1. To learn web development using server side programming technologies and to develop skills for building web application with dynamic contents.

Pre requisites:

- Knowledge of Java Programming language (core), HTML, XML and basics of SQL.

COURSE CONTENTS

UNIT-I

Introduction

Introduction to HTML, HTML tags, HTML forms. HTTP protocol: HTTP request, HTTP response. Introduction to CGI, PHP, ASP and compare these server side technologies with Servlets and JSP. Web Server; web Container, overview of web application.

UNIT-II

Servlets

Basics of Web, MVC in Server side Programming, Servlet API, Servlet Interface, GenericServlet, HttpServlet, Servlet Life Cycle, Working with Apache Tomcat Server, Steps to create a Servlet in Tomcat, Deployment descriptor. ServletRequest: Various Servlet Request methods for form data and HTTP header data.

UNIT-III

Session Tracking

Purpose and need of Session Tracing. Approaches to session tracking: Cookies, Hidden Form Field, URL Rewriting, Session tracking with JAVA Servlet API.

UNIT-IV

Database Connectivity and Servlet Collaboration

Database drivers, JDBC, API for Querying with database, API for updating the database. Servlet collaboration: Methods of Request Dispatcher interface: forward, Include. Sendredirect.

UNIT-V

Java Server Pages

Basic of JSP: Life Cycle of JSP, JSP API. Scripting Elements: - Scriptlet Tag, expression tag, declaration tag. 9 Implicit Object: out, request, response, config, application, session, page context, page and Exception. Directives: - page directive, include directive, taglib; Exception Handling, Action Elements, JSTL, Custom tags.

Learning Outcomes:

- To learn Server Side Programming concepts and its design and implementation issues.

BOOKS RECOMMENDED:

- [1] J2EE Tutorial from <https://developer.oracle.com/technology/Java>
- [2] Jason Hunter JAVA servlet programming, , William Crawford, O'Reilly, SPD.
- [3] Professional JAVA server programming, J2EE edition, volume I, Wrox, SPD.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER5S5 ENGINEERING LEADERSHIP	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The course to develop growth in decision-making, commit to absolute responsibility to deliver on time resourcefulness, ethical actions and integrity, trust and loyalty, work to empower the people, courage face difficult/high-risk actions head-on, vision, realizing the vision design processes and approaches, interpersonal skills, communicating and advocacy.
2. To excel in careers, broaden technical perspectives and acquire new business and leadership skills.
3. To build a quality to achieve vision and mission by working more effectively in teams.
4. To increase awareness of others by interpersonal skills so that contribution would be best in any situation.
5. To turn empathy into impact & uncover the strengths of team members and inspire them to common purpose.

Pre requisites:

- Basic knowledge about organization & business environment.

COURSE CONTENTS

UNIT-I

Develop Your Leadership Skills

Overview of leadership, essential qualities, generic leadership traits, team maintenance need, towards the functional approach to leadership, role as leader, turning the core leadership functions into skills, developing leader in you, lead at the strategic level, the functions of a strategic leader, the importance of practical wisdom, leadership for desirable change , grow leaders in your organization

UNIT-II

Leadership & Management

Visions, goals and strategies, the creativity thing - change and resistance to change, the proactive – reactive interface, time management, the dynamics of interdependent leadership, delegation

UNIT-III

Corporate Social Responsibility

Corporate governance and society, corporate governance and finance, governance and the board governance, the CEO and leadership

UNIT-IV

Leadership to Entrepreneurship

Meaning, definition of entrepreneurship, role characteristics, IPR

UNIT-V

Leadership Challenges In Business & Personal Financial Planning

Elements of leadership development, personal & corporate financial planning, how financial planning helps leaders.

Case Studies

Learning Outcomes:

After completing the course a student will be able to -

- 1) Experiential Learning to Enhance Knowledge, Skills and Attitudes
- 2) Built on this foundation, five pillars represent the core elements of the curriculum:
- 3) Leadership Capabilities
- 4) Product Development
- 5) Scientific Foundations
- 6) Challenge Project

BOOKS RECOMMENDED:

- [1] IMS Proschool, "Introduction to Financial Planning", Tata McGraw Hill Education.
 - [2] Madhu Sinha, "Financial Planning: A Ready to Reckoner", Tata McGraw - Hill Education
 - [3] Colombo plan staff college for Technician Education, Manila , Entrepreneurship Development, Tata McGrawHill
 - [4] N.K. Acharya, Text book on intellectual Property Rights, Asha Law House New Delhi,
 - [5] Raymond Morrison , Maintaining Effective Engineering Leadership , IET
-

COURSE SCHEME FOR B.E III YEAR-FULL TIME (CBCS)

ELECTRONICS & INSTRUMENTATION ENGINEERING DEPARTMENT

Semester-V

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	EIR5C1	OBJECT ORIENTED PROGRAMMING	PC	3-1-0	4
2	EIR5C2	ANALOG & DIGITAL COMMUNICATION	PC	3-1-1	4+1(P)
3	EIR5C3	POWER ELECTRONICS	PC	3-1-1	4+1(P)
4	EIR5EX	--	PC	3-1-1	4+1(P)
5	EIR5G3	DIGITAL SIGNAL PROCESSING	GE	3-1-0	4
6	EIR5L3	SOFTWARE WORKSHOP- II	--	0-0-1	1
7	SER5S5	PRINCIPLES OF MANAGERMENTS	--	2-0-0	2
8	EIR5V5	COMPREHENSIVE VIVA -V	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Elective Subjects

1	EIR5E1	MICROCONTROLLER(AVR)	PE	3-1-1	4+1(P)
2	EIR5E2	RANDOM PROCESSES	PE	3-1-1	4+1(P)
3	EIR5E3	INTRODUCTION TO MEMS	PE	3-1-1	4+1(P)
4	EIR5E4	FUZZY LOGIC AND NEURAL NETWORK	PE	3-1-1	4+1(P)
5	EIR5E5	ROBOTICS	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5C1 OBJECT ORIENTED PROGRAMMING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

- 1 To learn about object oriented concepts through Java programming.

Prerequisites (if any)

- Basics of computer programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming

Object oriented concepts, Need for object oriented programming, Principles of object oriented programming- Abstraction, Encapsulation, Polymorphism, Inheritance; Procedural language vs OOPs, Salient features of Java, Development of Java programming, Access modifiers, Introduction to object model, concept of object initialization, simple Java program structure,

UNIT-II

Introduction to Java classes and objects

Java data types, data type conversions and type casting, operators and their precedence, Types of operators, conditional statements- if—else, switch case, ternary operator, Iteration statements- for loop, while expression, do-while, branching mechanism, introduction to classes-class members and member functions, constructors, constructor overloading, String handling, wrapper classes, Arrays and vectors.

UNIT-III

Inheritance and Polymorphism

Inheritance basics, Types of inheritance, merits and demerits, application of keyword Super, method overriding and overloading, Inhibiting inheritance of class using Final, Dynamic method dispatch, runtime polymorphism, abstract classes, Interfaces, implementing interfaces, Packages in Java, importing packages and classes into programs, user defined packages

UNIT-IV

Exception handling and Multi-threading

Introduction to exceptions, need for exceptions, exception handling techniques, exception types, Using try-catch, finally, throw and throws keywords, user defined exceptions,, Multi-threading in Java, Thread class, the Main Thread, creation of new Threads, Thread states, Thread priority, Thread synchronization.

UNIT-V

Java I/O, Applets and Event Handling

Basic I/O classes, byte streams and character streams, class File, reading and writing Bytes, Applet basics, Applet architecture, Applet class and methods, Applet life cycle, event handling in Java, Delegation event model, types and sources of events, event listeners.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Understand the basic concepts of Java programming
- familiarize with the declaration of classes, arrays, operations with arrays, process of inheritance.
- Learn the implementation of interfaces, importing packages, handling exceptions and creating applets.
- learn how to write, compile and get results of simple application programs in Java

BOOKS RECOMMENDED:

- [1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.
- [2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [4] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

LIST OF PRACTICAL ASSIGNMENTS:

1. Write a program that converts inches to centimeters.
2. Write a program in which the program gives output numbers 1 to 10 along with their square roots.
3. Write a program to find the average of five double numbers.
4. Write a program to determine the area of a sector of circle of radius r and angle subtended by the sector at the centre, a . The values of these variables are entered by the user.
5. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
6. Write a program in which a sample of 8 random numbers is generated and an average value is determined by the user.
7. *Make a program which uses a for loop to calculate and display squares and cubes of numbers from 1 to 8.*
8. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
9. Write a program in which a sample of 8 random numbers is generated and an average value is determined.
10. Write a program in which a class is declared to deal with the characteristics of regular polygons and declare methods for determining area and perimeter. The length of the side and number of sides are declared public.
11. Write a program in which a method is declared to determine volume of a box with length, width and height as variables. The arguments should be passed on by reference.
12. Create a class Circle. Write a program to calculate:
 - CircumCircle() - to compute the circumference of a circle.

(ii) ArcLength – to compute the length of the arc for a given angle.

13. Within the main method of the class Circle, create an object of the class Circle. Compute Circle's circumference when the radius is 10 and arc length when the angle is 45.
14. Write an applet program to display strings in different colors that declares an array of type double and finds out the square roots of the array elements.
15. Write a program to demonstrate the multiplication of two matrices.
16. Write a program in which method overriding is implemented. The super class declares two instance variables i.e. radius and height, and define a method to determine the volume. The sub class determines the volume of cone and cylinder.
17. Make program to determine the trigonometric functions sin(), cos() and tan() by using methods of Math class for angles 30, 60, and 90 degrees.
18. Declare an interface with a method to calculate volume with one double parameter. Implement the same for finding volume of sphere and volume of a cube.
19. Make an applet program to display strings in different colors.
20. Make an applet program to draw a filled hexagon in orange color.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5C2 ANALOG AND DIGITAL COMMUNICATION	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1 The course contents are aimed to provide the basics of signals and linear time invariant systems used in communication systems
- 2 To review the basic Fourier techniques and its application in these processes.
- 3 To provide knowledge of basic principles of analog and digital communication.
- 4 To introduce the various processes like sampling, digital coding techniques, modulation and channel coding techniques that are used in modern telecommunication system.

Prerequisites:

- The basic knowledge of signals and systems and probability theory.

COURSE CONTENTS

UNIT-I

Signals and Systems: Types of signals-deterministic & random, periodic & non-periodic, analog & discrete, energy & power signals, Fourier series, Fourier transform & its properties, convolution, signal transmission through LTI systems, auto correlation, cross correlation, energy and power spectral density, their relationship with correlation function, probability, random variables & their moments, Gaussian probability density functions, its mean and variance.

UNIT-II

Amplitude Modulation: need of modulation in a communication system, block schematic of a typical communication system, AM modulation system, modulation index, generation (square law & switching modulator) & detection (envelope & square law detector) of AM wave, side bands & power content in an AM wave, a brief review of DSB-SC, SSB, VSB, AM transmitter block diagram, super heterodyne radio receivers and its advantages.

UNIT-III

Frequency Modulation: relationships between phase & frequency modulation, narrowband FM, wide band FM & their spectrum, transmission bandwidth of FM and PM signals, FM generation methods (direct & indirect) & FM detection methods (discriminators: balanced, phase shift and PLL detector), pre-emphasis & de-emphasis, FM transmitters, FM receivers (block diagram), comparison with AM systems in presence of noise, frequency division multiplexing.

UNIT-IV

Sampling, Digital encoding & Line coding: sampling theorem, types of sampling, quantization, digital encoding techniques PCM, DPCM, DM, ADM, line coding techniques NRZ, RZ, Biphasic, Duo Binary, their comparison based on various desirable properties.

UNIT-V

Digital modulation & Channel coding: A brief overview of generation, detection, constellation points of digital modulation techniques, ASK, FSK, PSK, MSK, introduction to optimum filter, matched filter. Channel coding techniques: error detection and correction codes, parity check code, minimum distance, hamming distance, overview of linear block code, cyclic code, convolutional code and their applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand basics of signals, frequency domain analysis & its importance.
- Understand the working of transmitter and receiver in analog & digital communication system.
- Understand about the digital data transmission using line coding.
- Understand how to detect and correct the errors introduced during the transmission.

BOOKS RECOMMENDED:

- [1] Lathi B.P., *Analog and Digital Communication Systems*, 3/e, Oxford Press, 2007
1. Proakis and Salehi, *Fundamentals of Communication Systems*, Pearson Education, 2005
 2. Taub & Schilling, *Principles of Communication Systems*, 4/e, McGraw Hill, 2013
 3. Bernard Sklar, *Digital communication*, 2/e, Pearson Education, 2007.
 4. Haykins Simon, *Analog and Digital Communication*, 3/e Willey Publication, 2007.
 5. Singh R.P. & Sapre, *Communication systems Analog & Digital*, TMH, 2007
 6. Carlson, *Communication Systems*, McGraw Hill, 2004

LIST OF PRACTICAL ASSIGNMENTS:

1. To study the working of sampling and reconstruction techniques for various sampling frequencies.
2. To study even/odd parity check code for single bit error detection.
3. To perform time division multiplexing and de- multiplexing.
4. Study and analysis of pulse code modulation and demodulation.
5. To study various data formatting schemes (unipolar, polar, AMI etc.).
6. Study and analysis of amplitude modulation & demodulation for different modulation index values.
7. Study and analysis of frequency modulation and demodulation.
8. Study and analysis of ASK modulation and demodulation.
9. Study and analysis of BPSK modulation and demodulation.
10. Study and analysis of QPSK modulation and demodulation.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (E&I)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5C3 POWER ELECTRONICS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1 To prepare the students to analyze & design different power converter circuits.
- 2 To acquire knowledge about various application of power electronics.

Prerequisites:

- Basic Electronics

COURSE CONTENTS

UNIT-I

Static Power Devices

Power semiconductor diodes & transistors, Thyristors, Construction, Characteristics, Ratings, Protection, Heating, Cooling, Mounting, Turn on methods, Gate characteristics, Firing circuits of thyristor, Introduction to other members of thyristor family like PUT, SUS, SCS, DIAC, TRIAC.

UNIT-II

Converters

Thyristor commutation techniques, Phase controlled rectifiers, Principal of phase control, Full wave controlled converters, Single-phase full wave converters, Three-phase thyristor converter circuits, Basic principle & power circuit of Dual converter & AC voltage controller.

UNIT-III

DC to DC Converter

Choppers: Basic principal of chopper operation, Control strategies, Step-up chopper, Different types of chopper circuits, Thyristor chopper circuits, Performance analysis.

UNIT-IV

Inverter

Single-Phase voltage source inverters, Principal of operation, Fourier analysis of single-phase inverters, Force-commutated thyristor inverters, Current source inverters, Pulse-width Modulated Inverters.

UNIT-V:

Industrial application of Power Electronics, SMPS, UPS, static switches, circuit breakers, solid state relays, concept of Electric drive.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Design the Inverter, chopper, rectifiers for high voltage.
- Apply design concepts for industrial applications.

BOOKS RECOMMENDED:

- [1] Muhammad H. Rashid, *Power Electronics Circuits, Devices & Applications*, 3/e. 2004, PHI
[2] Cyril W. Lander, *Power Electronics*, 3/e.1993, The McGraw-Hill
[3] Dr. P.S. Bimbhra, *Power Electronics*, 4/e. 2006, Khanna Publishers
[4] P.C. Sen, *Power Electronics*,
[5] Ned Mohan, *Power Electronics, Converters, Application & Design*, 2/e. 1995, John Wiley
[6] Joseph Vithayathil, *Power Electronics, Principles & Applications*, 6/e. 2010, McGraw Hill

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR5E1 MICROCONTROLLER	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: The knowledge of microcontroller is very essential for a student of BE in Electronics and Communication/instrumentation Engineering as the world is migrating towards automation rapidly in each and every fields. The students studying the subject are supposed to learn the architecture and programming of typical microcontroller. Students will be taught the basic use of an assembly as well as embedded C programming environment to control peripheral devices. Students will also understand the interfacing of various peripheral elements with microcontroller to design an automated system. The course will cover AVR, 8- bit Microcontroller in detail with sufficient exposure to design an automated system.

Prerequisite:

- Students should have in depth knowledge of Digital Logic Design, Microprocessor architecture as well as logical ability and programming skills to develop the code

UNIT-I

Introduction To Microcontroller

Microcontrollers and Embedded processors, Microcontroller survey, Overview of AVR family, AVR Microcontroller architecture, Register, status register, ROM space and other hardware modules, ATmega32 pin configuration &function of each pin.

UNIT- II

AVR Assembly Language Programming

Addressing modes of AVR, Different instructions, assembly language programs, I/O Port Programming, Time delay loop, BCD, ASCII conversion Program, Look-up table, Bit addressability, MACROS.

UNIT- III

AVR Programming in C

Data types, I/O programming, logic operations, Intel HEX file, Timer programming in assembly and C, Input capture and Wave Generator, PWM programming

UNIT-IV

Interrupt & Serial port programming

Interrupt environment, Interrupt programming and applications, Serial Port programming and applications

UNIT-V

Peripheral Interfacing

LCD and Keyboard Interfacing, ADC, DAC and sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, DC motor control, SPI protocol and Display interfacing, I2C Protocol and RTC interfacing

Learning Outcome:

After learning the course the students should be able to:

- Understand the architecture of AVR 8-bit Microcontroller.
- Describe the importance and function of each pin of AVR ATmega32 Microcontroller.
- Write, debug and simulate assembly as well as embedded C language programs.
- Understand Timer operation, Interrupt environment and Serial Communication.
- Interface I/O peripheral devices with microcontroller.
- Summarize the functionality of I2C and SPI protocol.

BOOKS RECOMMENDED:

[1] The AVR Microcontroller and Embedded Systems Using Assembly and C, By Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, Pearson Education.

[2] Programming and Customizing the AVR Microcontroller, By Dhananjay Gadre, McGraw Hill Education

[3] AVR ATmega32 data sheet

List of Open Source Software/learning website:

- Open source AVR simulator.
- www.atmel.com
- <http://www.arduino.cc/>

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5G3 DIGITAL SIGNAL PROCESSING	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4

Learning Objectives:

- 1 To provide the analysis techniques like for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Prerequisite(s):

- Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

UNIT-I

Introduction to signal processing , Discrete time signals and sequence operations , Discrete time systems properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system .Frequency domain representation of discrete time signals and systems(DTFT), properties,Representation of sequences by Fourier transforms.

UNIT-II

Introduction to Z- transforms , properties , Inverse Z – transform, ,block diagram representation of linear constant coefficient difference equation,Signal flow graph representation of LCCDE, Basic structures for IIR systems ,Basic structures for FIR systems. Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals, properties,circular convolution ,linear convolution using DFT, Implementing LTIV systems using DFT.

UNIT-III

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms.

UNIT- IV

Filter design techniques ,Design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing properties of commonly used windows.

UNIT-V

Introduction of DSP Processor.Types of Digital signal processors , Applications.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Understand the concept of fourier transform & fourier series.
- Acquire Knowledge and understanding of Filter design.

- Able to know the functioning of DSP processors.

BOOKS RECOMMENDED

- [1] Oppenheim and Schaffer, Discrete time signal processing, 2/E PHI, 2005.
- [2] Proakis and Manolakis, Discrete time signal processing, PHI, 2005.
- [3] S. Mitra, Discrete time signal processing, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics & Instrumentation Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5L3 SOFTWARE WORKSHOP	L	T	P	L	T	P	Total
	-	-	2	-	-	2	2
Only Practical examination will be held							

Learning Objective:

1. To familiarize students about Java based application programs

Prerequisites (if any):

- Basics of Java programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming, Java based application programs related to topics such as conditional statements, iteration statements with a focus on problems related to electronics and telecommunication.

UNIT-II

Introduction to string handling, Arrays, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-III

Introduction to Inheritance and Polymorphism, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-IV

Exception handling and Multi-threading, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-V

Java I/O, Applets and Event Handling, creating GUIs in AWT windows, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Write Java based application programs
- Learn to apply the concepts relating to various topic

BOOKS RECOMMENDED:

- [1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.
- [2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [4] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)				
Subject Code & Name		Instructions Hours per Week			Credits			
SER5S5 PRINCIPLES MANAGEMENT	OF	L	T	P	L	T	P	Total
		2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours								

Learning Objectives:

- 1 Understanding Management Concepts.
- 2 Acquire the knowledge of business environment.
- 3 Managing behavior of human at organizations with modern management concepts.
- 4 Understanding business ethics and social responsibility as Engineers.To develop the capacity to lead in a variety of circumstances.

Pre requisite:

- Nil

COURSE CONTENTS

UNIT- I

Introduction to Management:

Basic concepts of management: Definition, Essence, Principles, Roles, Level; Functions of management: Planning, Organizing, Staffing, Directing, Coordinating and controlling; Organizational efficiency & effectiveness; Roles of manager, Skills required in a manager.

UNIT- II

Management and Society:

Organization: Types and Structure; Business environments: Political, Economic, Legal, Social, Technological and International environment; Designing effective organization: Span of management, Delegation, Centralization and Decentralization; Formal and Informal organization.

UNIT- III

Management of Human at Work:

Human Resource Development: Interrelationship of managerial function; significance of staffing, Personnel management: Recruitment, Training, Performance appraisal, Employee retention; Managerial communication; Motivating individuals and work groups, Leadership for managerial effectiveness.

UNIT- IV

Management Ethics for Engineers:

Business ethics, Social responsibility of Business: Economical, Legal, Ethical and Philanthropic; Ethical responsibilities of Engineers toward society; Business and environment protection; Impact of engineering on society.

UNIT -V

Modern Management Concepts:

MBO: Principles, steps, advantages and disadvantages; Strategic management-SWOT analysis; Team Building: Definition of Team, Team Formation, Approaches, Goal Setting and Communication among Team Members. Models of relationship between professional and client.

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Identify the key management processes and the relevance of management in organisations.
- Understand the key management skills required in organisations and how these might be applied.
- Evaluate their own managerial skills and the ways in which these might be developed.
- Understand Team members while working with people from different background.

BOOKS RECOMMENDED:

- [1] R.D Agrawal, Organization & Management.1/E PHI 1997.
- [2] Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition, 2012.
- [3] Dinkar Pagare, Principles of Management, Sultan Chand & Sons, 2000.
- [4] G.K.Vijayaraghavan and M.Sivakumar, Principles of Management, Lakshmi Publications, 5th Edition, 2009.
- [5] Harold Koontz & Heinz Weihrich, Essentials of Management – An International perspective, 8th edition. Tata McGraw-Hill, 2009.
- [6] Charles W.L. Hill and Steven L McShane, Principles of Management, Tata Mc Graw-Hill, 2009.
- [7] Fleddermann, C.B., “Engineering Ethics,” Pearson Prentice Hall, Upper Saddle River, NJ, 2004.
- [8] Stephen P. Robbins, Timothy A Judge, Sanghi Seema Organizational Behavior, Pearson Education 13th Ed 2009.

COURSE SCHEME FOR B.E III YEAR-FULL TIME (CBCS)**INFORMATION TECHNOLOGY DEPARTMENT****Semester-V**

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	ITR5C1	THEORY OF COMPUTATION	PC	3-1-0	4
2	ITR5C2	OBJECT ORIENTED ANALYSIS AND DESIGN	PC	3-1-1	4+1(P)
3	ITR5C3	COMPUTER NETWORKS	PC	3-1-1	4+1(P)
4	ITR5EX	--	PE	3-1-1	4+1(P)
5	ITR5G3	APPLIED STATISTICS	GE	3-1-0	4
6	ITR5L3	SCRIPTING LANGUAGE LABORATORY	--	0-0-1	1
7	SIR5S5	PRINCIPLES OF MANAGERMENTS	--	2-0-1	2
8	ITR5V5	COMPREHENSIVE VIVA -V	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

1	ITR5E1	WEB TECHNOLOGIES	PE	3-1-1	4+1(P)
1	ITR5E1	UNIX AND SHELL PROGRAMMING	PE	3-1-1	4+1(P)
2	ITR5E2	EMBEDDED SYSTEMS	PE	3-1-1	4+1(P)
3	ITR5E3	DISTRIBUTED OPERATING SYSTEM	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))				
Subject Code & Name		Instructions Hours per Week			Credits			
ITR5C1 THEORY COMPUTATION	OF	L	T	P	L	T	P	Total
		3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

1. To provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (abstract) view toward algorithmic design and in general computation itself.

2. The course should in addition clarify the practical view towards the applications of these ideas in the engineering part as well.

Prerequisite:

- Students should have a background in discrete mathematics, data structures, and programming languages.

COURSE CONTENTS

UNIT-I

Finite Automata and Regular Languages

Motivation for studying theory of computation, Notion of formal languages and grammars, Kleene's Closure, Regular Expressions and Regular languages, closure properties of regular languages, Finite Automata. Finite Automata with output: Mealy and Moore machines, applications.

UNIT-II

Nondeterminism and Minimization

Nondeterministic Finite Automata, Acceptance condition. Kleene's Theorem, Myhill-Nerode relations, Minimization Algorithm, Non-Regular languages, Pumping Lemma for regular languages.

UNIT-III

Grammars and Context-Free Languages

Grammars and Chomsky Hierarchy, Context-Free Grammars, Context-Free Languages (CFLs), Inherent Ambiguity of CFLs, closure properties of CFLs, Eliminating useless symbols; null-productions; and unit productions, Chomsky Normal Form, Greibach Normal Form, Cock-Younger-Kasami (CYK) Algorithm, Applications to Parsing.

UNIT-IV

Pushdown Automata

Pushdown Automata (PDAs), PDAs vs CFLs. Deterministic PDAs and CFLs, applications, notion of acceptance for PDAs: acceptance by final states, and by empty stack; the equivalence of the two notions, Proof that CFGs generate the same class of languages that PDAs accept, Pumping Lemma for CFLs.

UNIT-V

Turing Machines and Computability

Introduction to Turing Machines, Configurations, Halting vs Looping, Turing computability, Nondeterministic, multitape and other versions of Turing machines. Church's thesis, Universal Turing Machines, Linear Bounded Automata (LBAs) and context-sensitive languages, Recursive and Recursively enumerable languages, Undecidability of Halting Problem and unsolvable problems about Turing Machines, the diagonalization language and proof that it is not Recursively enumerable.

Learning Outcomes:

After completing the course, the student will be able to:

11. Model, compare and analyse different computational models.
12. Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
13. Identify limitations of some computational models and possible methods of proving them.
14. Have an overview of how the theoretical study in this course is applicable to and engineering application like designing the compilers.
15. Have an understanding of the solvable and unsolvable problems and their computational behaviors.

BOOKS RECOMMENDED:

- [1] Daniel I.A. Cohen, Introduction to Computer Theory, John Wiley, 1990
 - [2] John C. Martin, Introduction to Languages and the Theory of Computation, 3/e Tata McGraw Hill, 2005
 - [3] J.E. Hopcroft and J.D.Ullman, Introduction to Automata, Languages and Computation, Narosa Publishing House, 1995
 - [4] J.E. Hopcroft, Rajeev Motwani and J.D.Ullman, Introduction to Automata, Languages and Computation, Pearson Education, Asia, 2002
 - [5] H.R. Lewis and C.H. Papadimitrou, Elements of the Theory of Computation, Prentice Hall Inc., 1999
 - [6] M. Sipser, Introduction to the Theory of Computation, Brooks/Cole Thomson Learning, 1996
 - [7] Zohar Manna, Mathematical Theory of Computation, McGraw Hill, 1997
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR5C2 OBJECT ORIENTED ANALYSIS & DESIGN	3	1	2	3	1	1	5
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

1. To learn object oriented analysis, modeling and design using UML.
2. To learn object oriented approach of software engineering.

Prerequisite:

- Knowledge of object oriented programming and basics of software engineering.

COURSE CONTENTS

UNIT-I

Rational Unified Process, Process Notation, Introduction to UML, Business Modeling Workflow, Object Oriented Analysis: Requirements Overview, Problem Statement, Glossary, Supplementary Specifications, Analysis and Design Overview; Architectural Analysis overview, Use Case Analysis: finding classes from use case behavior, describe responsibility, attribute and association; qualify analysis mechanism.

UNIT-II

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT-III

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT-IV

Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-V

Architectural Modeling: Architectural Pattern, Initial Architectural Layers, Deployment diagrams.

Learning Outcomes:

After successfully completing this course you will be able to:

- Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
- Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language

BOOKS RECOMMENDED:

- [1] Grady Booch, Object Oriented Analysis & Design with Application, Pearson Education India 2nd Edition.
- [2] Scott W. Ambler, The Object Primer, Cambridge University Press, 2nd Edition.
- [3] Philippe Kruchten, The rational Unified Processes & Introduction Pearson Education India 2nd Edition.
- [4] Grady Booch, Games Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley
- [5] M. Blaha, J. Rumbaugh, Object Oriented Modeling and Design with UML, Pearson Education 2nd Edition,2007.

LIST OF PRACTICAL ASSIGNMENTS:

- 1 To develop a problem statement
 - 2 Identify the business activities and develop an UML Activity diagram.
 - 3 Identify the conceptual classes and develop a domain model with UML Class diagram.
 - 4 Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
 - 5 Draw the State Chart diagram.
 - 6 Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
 - 7 Implement the Technical services layer.
 - 8 Implement the Domain objects layer.
 - 9 Implement the User Interface layer.
 - 10 Draw Component and Deployment diagrams.
-

Devi Ahilya University, Indore, India				III Year B.E. (Information Technology) (Full Time)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5C3COMPUTER NETWORK	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1 Build an understanding of the fundamental concepts of computer networking.
- 2 Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- 3 Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Prerequisite:

- Basic knowledge of programming and Data Structures.

COURSE CONTENTS

UNIT-I

Introduction

Definition and goals, Design issues, Network architecture-broadcast & point to point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN, WAN & MAN, protocols & services, types of service-connection oriented and connectionless, different protocols. Transmission Media: Twisted Pair, Coaxial cable, Fiber optic cable, Wireless transmission, telephone system, multiplexing, switching-circuit, packet & message switching, Virtual circuit switch.

Network devices-repeater, bridge, router, gateways, network interface cards, cabling system.

UNIT-II

Data Link Layer

Framing, Error control-Bit Error, causes of error, control methods, Flow control: Stop & wait, sliding window concept, piggybacking.

Local Area Network Technology: Protocols- Aloha, CSMA, CSMA/CD, Collision free protocols, IEEE 802 protocols, standard- topologies, cabling system, Network management, MAC addressing frame format. Ethernet.

UNIT-III

Network Layer

Introduction, features & design issues, Routing- different routing algorithms, congestion control, Internetworking- Concepts and architecture. Addressing-IP Addressing and subnet masking, IP protocols, Network Address Translation, Address resolution protocol (ARP).

UNIT-IV

Transport Layer

Introduction, design issues, Transport layer addressing, buffering, multiplexing, recovery, TCP/IP suit of protocols- TCP & UDP Network applications, Connection establishment, Connection release, TCP Header.

UNIT-IV

Application Layer

Introduction to application layer, Application layer protocols: Electronic mail, File transfer, remot login, WWW, Multimedia etc. Firewalls.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

Independently understand basic computer network technology.

- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

BOOKS RECOMMENDED:

[1] Computer Networks, Andrew. S. Tanenbaum, 4/e, Prentice Hall of India Private Ltd, 2003.

[2] Data Communications and Networking, Behrouz A Forouzan, 4/e, Tata McGraw Hill Education Private Limited.

[3] Data Communications & Networks, Achyut S. Godbole, Tata McGraw Hill Education Private Limited, 2002.

[4] Data and Computer Communication, William Stalling, 7/e, Prentice Hall of India Private Ltd, 2007.

LIST OF PRACTICAL ASSIGNMENTS:

During learning of course, students need to do assignments:

- 1 Study of various network devices in detail.
- 2 Study of basic network commands and network configuration commands.
- 3 Installation of LAN card.
- 4 Implementation of Bit Stuffing.
- 5 Implementation of Byte stuffing.
- 6 Implementation of error correcting codes.

- 7 Implementation of error detection codes
 - 8 Study of network IP.
 - 9 Implementation of various routing protocols.
 - 10 .Programming with Sockets.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR5G3 APPLIED STATISTICS	3	1	0	3	1	0	4
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

1. To enable the students to use statistics in computer science for a number of things, including data mining, data compression, speech recognition, vision & image analysis, artificial intelligence and network & traffic modeling.

Prerequisite:

- Elementary statistics, matrices and determinants, probability.

COURSE CONTENTS

UNIT-I

Correlation and regression analysis – linear correlation and regression, regression plane, multiple and partial correlation. Random variables-discrete and continuous random variables, cumulative distribution function. normal distribution.

UNIT-II

Elements of Hypothesis Testing : Null and Alternative hypotheses, Simple and Composite hypotheses, Critical Region, type I and type II Errors, Level of significance and size, p-value. Test of significance of large and small samples. Test of goodness of fit and independence of attributes.

UNIT-III

Design of experiments: Principle of experimental design, complete randomized block design, randomised block design, ANOVA: one-factor and two factor classifications.

UNIT-IV

Stochastic processes; classification, special stochastic processes-Poisson process, Markov process, discrete-time Markov chains (MCs): Chapman-Kolmogorov equations, n-step transition probabilities, classification of states and limiting probabilities, continuous-time Markov chains (MCs): birth-death processes.

UNIT-V

Queuing Theory: Objectives and characteristics of a Queuing System, classification of Queuing models, probability distribution of arrival and service times, Models (M/M/1, M/M/C, M/EK/1, M/D/1, D/D/1).

Reliability: Basic Concepts, Evaluation of system reliability.

Learning Outcomes:

Upon completing the course, students will be able to:

- Use statistics for a specialist study of applications areas like developing speech recognition software, quality management, software engineering, storage and retrieval processes and software and hardware engineering and manufacturing.

BOOKS RECOMMENDED:

[1] S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.

[2] Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.

[3] T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw - Hill Education, 2002.

[4] K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, John Wiley & Sons, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5E1	L	T	P	L	T	P	Total
WEB TECHNOLOGY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Introduce the students to emerging web technologies
2. Introduce the students with XML concepts and its application.
3. Motivate the students to develop 3 tier web applications.
4. Understanding of server side programming using Java Servlets.
5. To create awareness about the MVC.

Prerequisite: NIL

COURSE CONTENTS

UNIT-I

Introduction to Web Technology:

WWW and Protocols: TCP/IP , HTTP, DNS, SMTP etc. Web Servers (IIS, Apache etc)- Web Browsers, Uniform Resource Locator, HTTP Request and Response Types , n -Tier Architecture, Common Gateway Interface, Introduction to HTML5 (Elements, Attributes, Hyperlinks, Forms, div, Tables, links, images), Designing effective navigation.

Cascading Style Sheets- using CSS, background images, colors and properties, using fonts, borders and boxes, margins, positioning, animation and transition effects with CSS3.

UNIT-II JavaScript and DHTML

JavaScript and variables, functions, conditions, loops and repetition, Pop up boxes,, Event Handling, forms and validations, JavaScript standard objects, DOM, AJAX, Regular Expression XML Technologies: Introduction of XML, Validation of XML documents, DTD, XML for data files, HTML vs XML, Embedding XML into HTML documents, Displaying XML using CSS and XSL, Introduction to JQuery.

UNIT-III Java Servlets

Difference between CGI & Servlets, Servlet API, HttpServletRequest, HttpServletResponse, ServletConfig, ServletContext Session Management, RequestDispatcher , Filters

UNIT-IV Working with JDBC

Database concepts, Connection to server, creating database, creating a table, inserting data, altering tables, queries, JDBC Overview & Architecture, JDBC Driver Types, Connecting servlets with databases

UNIT-V Introduction to JSP

JSP API, JSP Life Cycle, JSP Elements, JSP Directives, JSP Implicit Objects, Configuring Error Pages in JSP, JSP Scopes(request, session, application, page), JSP Standard Actions, MVC architecture, Introduction to Expression Language and JSTL

Learning Outcomes:

After completion of the course students will be able to -

- Describe the concepts of WWW including browser and HTTP protocol.
- Develop the modern web pages using the HTML5 and CSS3 features with different layouts as per the need of applications.
- Use JavaScript to develop the dynamic web pages and validate data entered by users through forms
- Use Servlets to generate the web pages dynamically using the database connectivity. Develop modern Web Applications using the client and server side technologies and the web design fundamentals.

BOOKS RECOMMENDED:

- [1] Complete Reference JAVA - Naughton Schildt
- [2] Steven M. Schafer, "HTML, XHTML and CSS", Fourth Edition by, Wiley India Edition.
- [3] HTML 5, Black Book, Dreamtech Press
- [4] JDBC, Servlets and JSP Black Book, by Kogent Solutions Inc. Santosh Kumar K.
- [5] Web Technologies, Black Book, Dreamtech Press
- [6] Head First – Servlet and JSP - Bryan Basham, SPD O'REILLY, 2nd Edition.
- [7] Java Server Pages – Hans Bergsten, SPD O'REILLY, 3rd Edition
- [8] Web Design, Joel Sklar, Cengage Learning
- [9] Web Technologies – Achyut S Godbole and Atul Kahate
- [10] Jason Hunter, "Java Servlet Programming", 2nd Edition, O'reilly Publications.

LIST OF PRACTICAL ASSIGNMENTS:

During the learning of course, students need to do assignments:

- Design web pages using HTML5
- Style web pages using CSS3 features
- Accepting and validating user entered data using JavaScript
- Creating html pages to submit data to server
- Write a program to demonstrate the use of Servlet request and response as well as doGet () and doPost() methods.
- Collecting submitted data in a Servlet

- Using redirection and request forwarding in Servlets
 - Write a Servlet to store form data to database – using Type 4 JDBC driver and Database connectivity support from server.
 - Experiment with scriplets, declaration and expression tags
 - Writing java server pages to use JSP actions
 - Writing error pages in JSP
 - Develop sample application for session management using Servlet and JSP.
 - Develop sample application with database connectivity using Servlet/JSP
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5L3 SCRIPTING LANGUAGE PROGRAMMING LABORATORY	L	T	P	L	T	P	Total
	0	0	2	0	0	1	1
Duration of Practical: 2 Hours							

Learning Objectives:

- To learn basics and advance scripting language programming for modern computing requirements.

Prerequisite:Programming Concepts.

COURSE CONTENTS

UNIT-I

Features of Python ,Setting up path ,Working with Python ,Basic Syntax ,Variable and Data Types ,Operator, If ,If- else ,Nested if-else, For ,While ,Nested loops Break ,Continue Accessing Strings ,Basic Operations ,Function and Methods.

UNIT-II

Introduction of Sqlite, Database connectivity, Accessing tuples, Executing queries, Transactions ,Operations Working, Handling error Functions and Methods, Printing on screen Reading data from keyboard ,Opening and closing file ,Reading and writing files

UNIT-III

Graphics and GUI programming-Drawing using Tkinter and python. Networking and Multithreaded programming –Sockets, Thread and Processes, Chat application.

UNIT-IV

Class and object. Attributes, Inheritance ,Overloading ,Overriding ,Data hiding Regular expressions ,Match function ,Search function ,Matching VS Searching ,Modifiers ,Patterns, CGI(Introduction, Architecture ,CGI environment variable, GET and POST methods ,Cookies ,File upload.

UNIT-V

Web Frameworks - for developing server-side Web applications in Python, Web Browse Programming - interfacing with existing browsers and browser technologies

Learning Outcomes:

After completion of the course students will be able to –

- Apply scripting language programming skills for modern computing requirements.

BOOKS RECOMMENDED:

- [1] John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of india
- [2] R. Nageswara Rao, “Core Python Programming”, dreamtech
- [3] Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
- [4] Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley
- [5] Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication
- [6] Luke Sneeringer, “Professional Python”, Wrox
- [7] Hacking Secret Ciphers with Python”, Al Sweigart, URL-
<https://inventwithpython.com/hacking/chapters>

LIST OF PRACTICAL ASSIGNMENTS:

Students are given programming assignments to learn following .

1. How to take input through file/command line/ network.
2. Concept of Python List, Python String, Python Dictionary, Python Tuples and data type conversion.
3. Techniques of function calling, modules like import, from import etc.
4. Basic I/O functions and exception handling in Python.
5. Concept of object oriented programming, built in class attributes, regular expressions for pattern matching.
6. To work with database interfaces (Sqlite).
7. Concept of networking using Python
8. Web development using web framework flask,bootstrap.
9. Use of XML, CSS, HTML, AJAX to understand the concept behind the web browsing.
10. A project to be developed which uses the above concept.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
SIR5S5 PRINCIPLES MANAGEMENT	OF	L	T	P	L	T	P	Total
		2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours								

Learning Objectives:

- 1 Understanding Management Concepts.
- 2 Acquire the knowledge of business environment.
- 3 Managing behavior of human at organizations with modern management concepts.
- 4 Understanding business ethics and social responsibility as Engineers.To develop the capacity to lead in a variety of circumstances.

COURSE CONTENTS

UNIT- I

Introduction to Management:

Basic concepts of management: Definition, Essence, Principles, Roles, Level; Functions of management: Planning, Organizing, Staffing, Directing, Coordinating and controlling; Organizational efficiency & effectiveness; Roles of manager, Skills required in a manager.

UNIT- II

Management and Society:

Organization: Types and Structure; Business environments: Political, Economic, Legal, Social, Technological and International environment; Designing effective organization: Span of management, Delegation, Centralization and Decentralization; Formal and Informal organization.

UNIT- III

Management of Human at Work:

Human Resource Development: Interrelationship of managerial function; significance of staffing, Personnel management: Recruitment, Training, Performance appraisal, Employee retention; Managerial communication; Motivating individuals and work groups, Leadership for managerial effectiveness.

UNIT- IV

Management Ethics for Engineers:

Business ethics, Social responsibility of Business: Economical, Legal, Ethical and Philanthropic; Ethical responsibilities of Engineers toward society; Business and environment protection; Impact of engineering on society.

UNIT -V

Modern Management Concepts:

MBO: Principles, steps, advantages and disadvantages; Strategic management-SWOT analysis; Team Building: Definition of Team, Team Formation, Approaches, Goal Setting and Communication among Team Members. Models of relationship between professional and client.

Case Study

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Identify the key management processes and the relevance of management in organisations.
- Understand the key management skills required in organisations and how these might be applied.
- Evaluate their own managerial skills and the ways in which these might be developed.
- Understand Team members while working with people from different background.

BOOKS RECOMMENDED:

[1] R.D Agrawal, Organization & Management.1/E PHI 1997.

[2] Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition, 2012.

[3] Dinkar Pagare, Principles of Management, Sultan Chand & Sons, 2000.

[4] G.K.Vijayaraghavan and M.Sivakumar, Principles of Management, Lakshmi Publications, 5th Edition, 2009.

[5] Harold Koontz & Heinz Weihrich, Essentials of Management – An International perspective, 8th edition. Tata McGraw-Hill, 2009.

[6] Charles W.L. Hill and Steven L McShane, Principles of Management, Tata Mc Graw-Hill, 2009.

[7] Fleddermann, C.B., “Engineering Ethics,” Pearson Prentice Hall, Upper Saddle River, NJ, 2004.

[8] Stephen P. Robbins, Timothy A Judge, Sanghi Seema Organizational Behavior, Pearson Education 13th Ed 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5E2 UNIX AND SHELL PROGRAMMING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The student will have ability to:

- Understand the UNIX operating system and its memory management, input/output Processing, internal and external commands.
- Learn the File Systems and Process Management of UNIX.
- Learn and explore the use of operating system utilities such as text editors. Understand Shell Scripting and Shell Programming.

Prerequisites:

- Basic knowledge of Operating System concepts along with DOS (Disk Operating System) is essential. Fundamentals of Programming language is helpful.

COURSE CONTENTS

UNIT-I

Overview of UNIX:

What is UNIX Operating System? Architecture, Kernel & Shell, Installation Process, Features, Internal And External Commands, Basic Commands: cal, date, echo, bc, script, passwd, PATH, who, uname, pwd, cd, mkdir, rmdir etc. Command Structure, Shell Script & Shell Programming, UNIX Server.

UNIT-II

File System:

Definition of File System, Boot Block, Super Block, Inode. File creations and its related commands cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff. Zipping & unzipping files, gzip, tar, zip, df, du, mount, umount, etc. The vi editor. File Permissions with chgrp & chmod. **Process Control:** Viewing a Process, Command to display Process, Process Attributes, Process States, Process Fields, ps Commands options, Handling Jobs, Foreground & Background Jobs.

UNIT-III

Redirection & Pipes:

Standard I/O Streams, Redirection & Pipes, Command Execution, Command-Line Editing, Quotes. **Filters:** Filters, Concatenating, Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Ordering a File. **Regular Expressions:** Atoms, operators, grep, sed, awk etc.

UNIT-IV

System Security:

Physical Security, Boot level security (GRUB), Controlling System Access, Restricted Shells, File Access Commands, Access Control List(ACLs), Restricting Root Access, Monitoring & Securing Super User Access.

UNIT-V

Shell Scripting:

Introduction to Shell, Types of Shell, C shell features, writing first script writing script, Executing & Debugging script. Shell Programming: Shell variables, Output, Input, exit Status of a Command, Branching Control Structures, Loop-Control Structure, and Continue and break Statements, Expressions, Command Substitution, Command Line Arguments and Functions.

Learning Outcomes:

Upon completion of the subject, students will be able to:

- Identify and use UNIX utilities to create and manage simple file processing operations,
- Organize directory structures with appropriate security.
- Effectively use the UNIX system.
- Monitor system performance and learn the shell scripts.
- Use the shell scripts in designing a programs for engineering problems.

BOOKS RECOMMENDED:

- [1] Yashavant P. Kanetkar “**Unix Shell Programming**”, BPB Publications.
- [2] Venkatesh Murthy, “Introduction to Unix &Shell”, Pearson Edu.
- [3] Forouzan, “Unix & Shell Programming”, Cengage Learning.
- [4] Sumitab Das,”Unix Concept & Application”, TMH.
- [5] Venkateshwavle,”Linux Programming Tools Unveil`ed”, BS Publication.
- [6] Richard Peterson,”Unix Complete Reference”,TMH.

LIST OF PRACTICAL ASSIGNMENTS:

1. Execution of various file/directory handling commands.
2. Simple shell script for basic arithmetic and logical calculations.
3. Shell scripts to check various attributes of files and directories.
4. Shell scripts to perform various operations on given strings.
5. Shell scripts to explore system variables such as PATH, HOME etc.
6. Shell scripts to check and list attributes of processes.
7. Execution of various system administrative commands.

8. Use sed instruction to process /etc/passwd file.
9. Write a shell script to display list of users currently logged in.
10. Write a shell script to delete all the temporary files.
11. Write a shell script to search an element from an array using binary searching.
12. Write script to print the message "Hello" on the Console.
13. Write script to perform following basic math operation as :
 - Take input from keyboard
 - Take input as command line parameter
14. Write script to display current date, time, username and current directory.
15. Write shell script to show various system configurations like: a)
 - Currently logged user and his long name
 - b) Current shell
 - c) Your home directory
 - d) Your operating system type

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5E4 DISTRIBUTED OPERATING SYSTEM	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- 1 Provide an understanding of the principles of distributed operating systems. Questions concerning distributed system architecture, concepts and design, functioning; and how these meet the demands of contemporary distributed applications will be addressed
- 2 Undertake problem identification, formulation and solution. Capacity for independent critical thought, rational inquiry and self-directed learning.
- 3 Realizing the challenges encountered during the design and analysis of a distributed System.
- 4 Identifying efficient methods for facing these challenges and designing efficient distributed algorithms and systems.

Pre requisites:

- Basic knowledge of Operating System concepts.

COURSE CONTENTS

UNIT-I

Introduction to Distributed Systems:

Distributed Computing Systems, Evolution of Distributed Computing System, Distributed Computing System Models, Distributed Operating System, Examples of Distributed Systems, Design Approaches & Issues, Computer Network and Layered protocols, Network Operating System and Distributed Operating System, Introduction to Distributed Computing Environment (DCE), Operating System Structures.

UNIT-II

Message Passing & Remote Procedure Calls(RPC):

Overview of Computer Networks, Communication Inter-process communication(IPC), The Critical Section Problem, Features of a Good Message Passing System, Issues in IPC by Message Passing, Synchronization, Group Communication, Case Study: 4.3 BSD UNIX IPC

Mechanism. The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Case Studies: Sun RPC.

UNIT-III

Synchronization in Distributed Systems:

Logical clocks, Physical clocks, Vector Clock, Clock synchronization and related algorithms, Mutual Exclusion, Non-Token Based Algorithms – Lamport’s Algorithm, Token-Based Algorithms, Suzuki-Kasami’s Broadcast Algorithm, Election Algorithms, Dead locks in Distributed Systems, Thrashing.

UNIT-IV

Distributed Shared Memory: Introduction, General Architecture of DSM Systems, Algorithm, Protocols, Design and Implementation Issues of DSM, Page based Distributed Shared Memory, Shared variable Distributed shared Memory, and Object based Distributed shared Memory, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. **Resource Management:** Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach, **Process Management:** Introduction, Process Migration, Threads, Case studies.

UNIT-V

Distributed File Systems: Introduction, Desirable Features & Goals of Distributed File System, File models, File-Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions, Design Principles, Security in Distributed File system. Trends in distributed file system, case study Case study: Amoeba, Mach, Chorus and their comparison.

Learning Outcomes:

Upon completing the course, students will be able to:

- Distinguish the theoretical and conceptual foundations of distributed computing. Recognize the feasibility and the impossibilities in managing resources.
- Identify the core concepts of distributed systems and also identify the problems in developing distributed applications.
- Apply existing solutions to the core problems and develop appropriate variations of existing solutions to meet the development contexts.
- Examine how existing systems have applied the concepts of distributed operating systems in designing large systems, and will additionally apply the concepts to develop sample systems.

BOOKS RECOMMENDED:

- [1] P K Sinha, "Distributed operating systems; Concepts and design", PHI Learning.
- [2] Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
- [3] Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
- [4] Sunita Mahajan & Shah, Distributed Computing, Oxford Press
- [5] Tanenbaum and steen, "Distributed systems: Principles and paradigms", 2nd edition, PHI Learning.
- [6] Asilberschatz P.B Garvin Operating System Concept, John Wiley & Sons (Asia) Pte 2000.

LIST OF PRACTICAL ASSIGNMENTS:

1. Implementation of Deadlock using JAVA programs.
 2. Implementation of Bankers algorithms to avoid deadlocks.
 3. Implementation Ring Election algorithm.
 4. Implementation of Bully Election algorithm.
 5. Prepare a multi-cast program using JAVA APIs.
 6. Simulate Sequential file allocation strategy.
 7. Simulate Indexed file allocation strategy.
 8. Simulate Linked file allocation strategy.
 9. Implement file organization strategies single level, Two level and Hierarchical.
 10. Case Study on:
 - CORBA, RMI and RPC
 - Reservation System
 - Online Chain management
 - Inventory management
-

COURSE SCHEME FOR B.E III YEAR-FULL TIME (CBCS)

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

Semester-V

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	ETR5C1	OBJECT ORIENTED PROGRAMMING	PC	3-1-0	4
2	ETR5C2	DIGITAL COMMUNICATION	PC	3-1-1	4+1(P)
3	ETR5C3	EMF & TRANSMISSION LINES	PC	3-1-1	4+1(P)
4	ETR5EX	--	PE	3-1-1	4+1(P)
5	ETR5G3	DIGITAL SIGNAL PROCESSING	GE	3-1-0	4
6	ETR5L3	SOFTWARE WORKSHOP- II	--	0-0-1	1
7	STR5S5	PRINCIPLES OF MANAGERMENTS	--	2-0-0	2
8	ETR5V5	COMREHENSIVE VIVA -V	VIRTUA L	0-0-4	4
TOTAL CREDITS					30

ELECTIVE SUBJECTS

1	ETR5E1	MICROCONTROLLER (AVR)	PE	3-1-1	4+1(P)
1	ETR5E2	PROBABILITY & RANDOM PROCESSES	PE	3-1-1	4+1(P)
2	ETR5E3	SMART SENSOR & MEMS	PE	3-1-1	4+1(P)
3	ETR5E4	ARTIFICIAL INTELLIGENCE	PE	3-1-1	4+1(P)
4	ETR5E5	POWER ELECTRONICS	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5C1	L	T	P	L	T	P	Total
OBJECT ORIENTED PROGRAMMING	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objective:

1. To learn about object oriented concepts through Java programming.

Prerequisites:Basics of computer programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming:

Object oriented concepts, Need for object oriented programming, Principles of object oriented programming- Abstraction, Encapsulation, Polymorphism, Inheritance; Procedural language vs OOPs, Salient features of Java, Development of Java programming, Access modifiers, Introduction to object model, concept of object initialization, simple Java program structure,

UNIT-II

Introduction to Java classes and objects

Java data types, data type conversions and type casting, operators and their precedence, Types of operators, conditional statements- if—else, switch case, ternary operator, Iteration statements-for loop, while expression, do-while, branching mechanism, introduction to classes-class members and member functions, constructors, constructor overloading, String handling, wrapper classes, Arrays and vectors.

UNIT-III

Inheritance and Polymorphism

Inheritance basics, Types of inheritance, merits and demerits, application of keyword Super, method overriding and overloading, Inhibiting inheritance of class using Final, Dynamic method dispatch, runtime polymorphism, abstract classes, Interfaces, implementing interfaces, Packages in Java, importing packages and classes into programs, user defined packages

UNIT-IV

Exception handling and Multi-threading

Introduction to exceptions, need for exceptions, exception handling techniques, exception types, Using try-catch, finally, throw and throws keywords, user defined exceptions,, Multi-threading in Java, Thread class, the Main Thread, creation of new Threads, Thread states, Thread priority, Thread synchronization.

UNIT-V

Java I/O, Applets and Event Handling

Basic I/O classes, byte streams and character streams, class File, reading and writing Bytes, Applet basics, Applet architecture, Applet class and methods, Applet life cycle, event handling in Java, Delegation event model, types and sources of events, event listeners.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Understand the basic concepts of Java programming
- Familiarize with the declaration of classes, arrays, operations with arrays, process of inheritance.
- Learn the implementation of interfaces, importing packages, handling exceptions and creating applets.
- learn how to write, compile and get results of simple application programs in Java

BOOKS RECOMMENDED:

- [1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.
- [2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [4] Cay S.Horstmann, Core Java, vol-1, 8/E, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5C2	L	T	P	L	T	P	Total
DIGITAL COMMUNICATION	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The course contents are aimed to provide:

- Knowledge of various digital encoding techniques.
- Understanding of various baseband and bandpass transmission and reception techniques. Acquaintance with source encoding and channel encoding techniques.
- To know why digital communication systems are better than analog communication systems.

Prerequisites: Knowledge of Fourier analysis and random variables.

COURSE CONTENTS

UNIT-I

Review of Fourier transforms, Energy Spectral Density, Power Spectral Density and their properties, sampling & its types, TDM. Digital encoding techniques: PCM, quantization (uniform and non-uniform), quantization noise, DPCM, ADPCM, DM, ADM and their comparison.

UNIT-II

Line coding techniques: Desirable characteristics of Line codes, NRZ and RZ forms of unipolar, polar & bipolar and bi-phase line codes and their waveforms, PSDs and comparison. Inter Symbol Interference, pulse shaping (Raised cosine spectrum, duo-binary signalling), Eye patterns. Baseband reception and probability of error, optimum filter, matched filter, correlation receivers.

UNIT-III

Band-pass modulation and demodulation techniques: BPSK, DPSK, QPSK, BFSK, M-ary PSK & FSK, MSK (their generation, detection, waveforms, PSDs, signal constellation diagrams, performance of these systems in the presence of noise). Introduction to Spread Spectrum techniques.

UNIT-IV

Information theory:

Concept of amount of information, entropy & its types, source encoding such as Shannon-Fano, Huffman Codes. Information rate, channel capacity (its calculation for Binary Symmetric channel, Binary Erasure Channel, noiseless channels and Gaussian channel), Shannon's theorem, bandwidth and S/N trade off .

UNIT-V

Channel encoding techniques:

Linear Block codes (Systematic Linear Block codes, Parity check matrix, Syndrome testing), cyclic codes, Hamming codes, BCH codes, convolution codes, their encoding and decoding operation.

Learning Outcomes:

Upon Completing the Course, Student will able to learn:

- Various processes and their types involved in digital communication system.
- Application and selection of these processes with their types, according to requirement.

BOOKS RECOMMENDED:

- [1] Lathi B. P., Modern Analog and Digital Communication Systems, 4th ed., Oxford Univ. Press, 2011.
- [2]. Haykin Simon Communication System, 4th ed., Wiley Publication, 2001.
- [3]. Schaum's Outline Series, Analog and Digital Communication, 2nd ed., TMH, 2006.
- [4]. Taub & Schilling, Principles of Communication System, 4th ed., TMH, 2013.
- [5]. Dr. Bernard Sklar, Digital Communication, 4th ed., Pearson education, 2001.
- [6]. Proakis & Salehi, Digital Communication, 2nd ed., McGraw Hill, 2004.

LIST OF PRACTICAL ASSIGNMENTS:

- Fourier synthesis of various waveforms.
 - (a) To perform Fourier synthesis of square wave.
 - (b) To perform Fourier synthesis of triangular wave.
 - (c) To perform Fourier synthesis of AM with suppressed carrier wave.
 - (d) To perform Fourier synthesis of AM with carrier wave.
 - (e) To perform Fourier synthesis of DTMF signals.
- Performance evaluation of digital communication system in presence of various line encoding techniques .
 - (a) To generate various line encoding techniques like unipolar, polar, bipolar with RZ and NRZ format.
 - (b) To draw the PSD of these line encoding techniques.
 - (c) To compare the performance of these line encoding techniques.
- Performance evaluation of digital communication system in presence of various digital modulation techniques .
 - (a) To evaluate the performance of MPSK for $M=2,4,8,16$ and their comparison study.
 - (b) To evaluate the performance of ASK.
 - (c) To evaluate the performance of MFSK for $M=2,4,8,16$ and comparison study.
 - (d) How will select a particular modulation technique for a particular application
- Performance evaluation of digital communication system in presence of various error correcting codes .
 - (a) To evaluate the performance of Hamming code.

- (b) To evaluate the performance of Convolution code.
 - (c) Performance comparison of these two codes.
 - (d) How will select a particular channel code for a particular application.
 - Performance evaluation of digital communication system in presence of various communication channels .
-
- (a) To evaluate the performance of AWGN channel.
 - (b) To evaluate the performance of fading channel.
 - (c) Performance comparison of different communication channels.
 - (d) What will be the impact of a communication channel on the performance of digital communication system.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR5C3							
EMF AND TRANSMISSION LINE	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To analyze field potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations To understand principles of propagation of uniform plane waves.
- To understand principles of Transmission Lines

Prerequisites:

- Matrix and Vector Algebra

COURSE CONTENTS

UNIT- I

Vector Analysis:

General Treatment on Cartesian, cylindrical, spherical and general curvilinear co-ordinate systems with reference to vectors, operation of Gradient, Divergence, Curl, Laplacian, Gauss's Divergence theorem, Stoke's theorem.

UNIT II

Electrostatics:

Review of electric field quantities and their definitions. Gauss's flux theorem, Poisson's equation and Laplace -, Uniqueness theorem, Green's theorem, Coulomb's law, dipole moment. Electrostatic field in dielectric: polarization, electric flux density, boundary conditions, capacitor and capacitance, electrostatic shielding, energy stored in electric fields.

UNIT- III

Magnetic Fields and Electromagnetic Induction:

Magnetic flux and flux density, static currents in conducting media, Ampere's circuital law, Biot-Savart law, boundary conditions between magnetic media, magnetic force, magnetic potential, magnetic force and torque, Lorentz force on straight and long current

carrying conductors in magnetic field, magnetic force between two long and parallel current carrying conductors, Magnetic dipole and dipole moment, energy stored in magnetic field. Faraday's law for induction (transformer and motion), inductor and inductance (self and mutual).

UNIT- IV

Maxwell's Equations & Electromagnetic Waves:

Maxwell's equations, equation of continuity displacement current, Maxwell's equation in point and integral forms, time-varying potentials, wave equations, uniform plane waves in dielectrics and conductors, power loss in a plane conductor, energy storage, Sinusoidally time varying uniform plane wave in free space & conductors, Poynting's vector theorem.

UNIT-V

Transmission Lines :

line impedance, input Introduction of transmission line, line equations, equivalent circuit , reflection coefficient , impedance, measurement of secondary constants, line sections, of transmission lines. SWR and power, Smith chart and its applications, some applications

Learning Outcomes:

Upon completing the Course Student will able:

- To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields & Transmission Line so that an in depth understanding of antennas, electronic devices, Waveguides is possible.

BOOKS RECOMMENDED:

- [1]. Engineering Electromagnetics, William H. Hayt; Mc-Graw Hill.
- [2]. Theory and Problems of Electromagnetics, Joseph A. Edminister; McGraw Hill.
- [3]. Element of electromagnetic Electromagnetic, Mathew N.O Sadiku, Oxford University Press.
- [4]. Elements of Engineering Electromagnetics, N. Rao, Prentice Hall.
- [5]. Electromagnetics for Engineers, Fawwaz T. Ulaby, Pearson Education.

LIST OF PRACTICAL ASSIGNMENTS:

1. To Study Vector Analysis with Matlab.
2. To Study the Surface and Volume Integrals with Matlab.
3. To study E Field of Linear Charge with Matlab.
4. To Study E Field of Surface Charge with Matlab.
5. To Study Electric Flux Density with Matlab.
6. To Study Electric Flux through a Surface with Matlab.
7. To Study Magnetic Field of a Current Sheet with Matlab.
8. Measuring the Characteristics of a line.
9. Measuring the Attenuation of a line.
10. Measuring the input Impedance of the line.
11. Measuring Phase Displacement between the Current & Voltage at input of line.
12. To Study Stationary Waves.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5E1	L	T	P	L	T	P	Total
MICROCONTROLLERS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

1. In this student would learn the architecture of AVR, interfacing and controlling of peripheral devices through programming in assembly as well as in embedded C of AVR microcontroller. The course will cover AVR, 8-bit Microcontroller in detail with sufficient exposure to design an automated system.

Prerequisite:

- Knowledge of Digital Logic Design, Microprocessor architecture, logical ability and programming skills.

COURSE CONTENTS

UNIT-I

Introduction to Microcontroller

Microcontrollers and Embedded processors, Microcontroller survey, Overview of AVR family, AVR Microcontroller architecture, Register, status register, ROM space and other hardware modules, ATmega32 pin configuration & function of each pin.

UNIT-II

AVR Assembly Language Programming

Addressing modes of AVR, Different instructions, assembly language programs, I/O Port Programming, Time delay loop, BCD, ASCII conversion Program, Look-up table, Bit addressability, Accessing EEPROM, MACROs.

UNIT - III

AVR Programming in C and Timers

Data types, I/O programming, logic operations, Intel HEX file, Timer programming in assembly and C, Input capture and Wave Generator, PWM programming.

UNIT- IV

Interrupt & Serial Port Programming

Interrupt environment, Interrupt programming and applications, Serial Port programming and applications.

UNIT- V

Peripheral Interfacing

LCD and Keyboard Interfacing, ADC, DAC and sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, DC motor control, SPI protocol and Display interfacing, I2C Protocol and RTC interfacing.

Learning Outcome:

After learning the course the students should be able to:

- Understand the architecture of AVR 8-bit Microcontroller.
- Describe the importance and function of each pin of AVR ATmega32 Microcontroller.
- Write, debug and simulate assembly as well as embedded C language programs.
- Understand Timer operation, Interrupt environment and Serial Communication.
- Interface I/O peripheral devices with microcontroller.
- Summarize the functionality of I2C and SPI protocol.

BOOKS RECOMMENDED:

[1] The AVR Microcontroller and Embedded Systems Using Assembly and C, By Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, Pearson Education.

[2] Programming and Customizing the AVR Microcontroller, By Dhananjay Gadre, McGraw Hill Education

[3] AVR ATmega32 data sheet

LIST OF PRACTICAL ASSIGNMENTS:

- BASIC PROGRAMS IN ASSEMBLY LANGUAGE :-
 - 1 Write a program to Toggle all bits of PORTB by sending value \$55 and \$AA continuously. Put delay between each issuing of data to PORTB.
 - 2 Write a program when an LED is connected to each pin of PORTD. Turn on each LED from pin D0 to D7.
 - 3 Write a program to create a square wave of 50% duty cycle on bit 0 to PORTC.
 - 4 Write a program when a Switch is connected to pin PB2.
 - i. IF SW=0, send the letter 'N' to PORTD.
 - ii. IF SW=1, send the letter 'Y' to PORTD.
 5. Write a program when a Switch is connected to pin PB0 and an LED to pin PB7. To get status of SW and send it to the LED.
- AVR PROGRAMMING in C:-
 - 1 Write a program to toggle all bits of PORTB 200 times.
 - 2 Write a program to toggle all bit PORTB continuously with 100ms delay XTAL=8MHz.

- 3 WAP to read pins 1 and 0 of PORTB, send ASCII code to PORTD as per following status of Pin1 Pin0.

Pin1	Pin0	
0	0	send '0' to port D

11 1 send '1' to port D

12 0 send '2' to Port D

1	1	send '3' to Port D
---	---	--------------------

- 4 Write a program to send value 44H serially one bit at a time via PORTC pin3 (LSB FIRST).
- 5 Write a program to store 'G' into location 0x005F of EEPROM.

- CODE CONVERSION (IN ASSEMBLY AND C):-

- 1 Write a program to perform checksum byte calculation for data.
- 2 Write a program to calculate the checksum byte for given data.
- 3 Write a program to convert hexadecimal number FDH to decimal and display digit on PORTB, PORTC, PORTD.
- 4 Write a program to convert Packed BCD to ASCII.
- 5 Write a program to convert ASCII to packed BCD.

- TIMER PROGRAMMING (IN ASSEMBLY AND C):-

- 1 Write a program to toggle all bits of PORTB using some delay. Use CTC mode. Assume XTAL=8MHz.
- 2 Write a program using of prescaler 64 to generate delay of 1920 μ s. Assume XTAL=8MHz.
- 3 Toggle only the PORTB.4, Use Timer1, normal mode, no prescaler to create the delay of 2ms.
- 4 Use TOV0 flag to extend Timer0 to a 16-bit counter and display on PORTC and PORTD.

- INTERRUPT AND SERIAL PORT PROGRAMMING (IN ASSEMBLY AND C):-

- 1 Using Timer1, toggle pin PORTB.5 every second, while at the same time transfer data from PORTC to PORTD.
- 2 Write a program to receive bytes of data serially and put on PORTB. Set baud rate =9600 & use 1 stop bit.
- 3 Write a program to toggle PORTC.3, whenever INT0 goes low.
- 4 Write a program to transmit the letter 'G' serially at 9600baud, continuously.

- 13 LCD, KEYBOARD AND OTHER PERIPHERAL INTERCACING AND PROGRAMMING (IN ASSEMBLY AND C)

- Write "HELLO" on the LCD using port A of Atmega 32.
- Interface Keyboard with Atmega 32 and write a program to send ASCII code to Port D for any key pressed.
- Interface DAC 0808 with Atmega 32 and generate a triangular wave.
- Interface LM 34 with Atmega 32 and write a program to read the sensor

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Subject Code & Name	Instructions Hours per Week			Credits			
ETR5E2	L	T	P	L	T	P	Total
RANDOM PROCESS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: The course aims at providing the necessary basic concepts in random processes. Knowledge of fundamentals and applications of random phenomena will greatly help in the understanding of topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

Prerequisite: Basic Mathematics

COURSE CONTENTS

UNIT I

Random variables Discrete and continuous random variables – Moments - Moment generating functions and their properties. Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and normal distributions – Function of Random Variable.

UNIT II Two dimensional random variables

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem (for iid random variables)

UNIT III Classification of random processes

Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process – Random telegraph process.

UNIT IV Correlation and spectral densities

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khinchine relation – Relationship between cross power spectrum and cross correlation function

UNIT V Linear systems with random inputs

Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

Learning Outcomes:

At the end of the course, the students would

- Have a fundamental knowledge of the basic probability concepts.
- Have a well-founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Be able to analyze the response of random inputs to linear time invariant systems.

BOOKS RECOMMENDED:

[1]. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint (2007) (For units 1 and 2)

[2]. Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002.(For units 3, 4 and 5).

REFERENCES

[3]. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw-Hill edition, New Delhi, 2004.

[4] Leon-Garcia,A, “Probability and Random Processes for Electrical Engineering”, Pearson Education Asia, Second Edition, 2007

[5]. Yates and D.J. Goodman, “Probability and Stochastic Processes”, John Wiley and Sons, Second edition, 2005.

LIST OF PRACTICAL ASSIGNMENTS:

- Based on Matlab and Simulink toolboxes

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Subject Code & Name	Instructions Hours per Week			Credits			
ETR5E3	L	T	P	L	T	P	Total
SMART SENSORS AND MEMS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: The student will gain a basic understanding of current Microelectromechanical Systems (MEMS) technology and industrial instrumentation systems, with particular emphasis on smart sensors and actuators. The course introduces the fundamental of measurement systems and focuses in particular on MEMS fabrication, MEMS transducer types and applications.

Prerequisite: Basic Electronics

COURSE CONTENTS

UNIT- I: Principles of Sensing, Classification and Terminology of Sensors, Measurands. Some basic discussion about electric field, potential, capacitance, resistance etc.

UNIT- II : Acoustic and Magnetic Sensors, Mechanical Sensors, Radiation and Thermal Sensors Chemical and Biosensors, Electronic Interface and Integrated Sensors/Design Projects/ Wireless integration.

UNIT- III : Introduction to Microsystems, MEMS microsystem components, Microfluidics microsystem components, Microfluidics Continued microsystem components, Electronic/wireless integration, putting it all together- system design.

UNIT- IV : Introduction to Bulk Micromachining, Isotropic and Orientation Dependent Wet Etching, Dry Etching, Buried Oxide Process, Silicon Fusion Bonding, Sacrificial Layer Technology,

UNIT- V: Surface Micromachining using Plasma Etching, ,Combined IC Technology and Anisotropic Wet Etching, Processes Using Both Bulk and Surface Micromachining, Adhesion Problems in Surface Micromachining, Surface Versus Bulk Micromachining

Learning Outcomes:

At the end of this course, students will be able to:

- Select the right sensor for a given application.
- Design basic circuit building blocks.
- Simulate, synthesize, and layout a complete sensor or sensor system
- Design MEMS device or microsystem ready for fabrication tools.

BOOKS RECOMMENDED:

- [1] Brignell JE and White NM (1996). Intelligent sensor systems revised edition.
- [2] Beeby SP, Ensell GJ, Kraft M and White NM (2004). MEMS Mechanical Sensors.
- [3] Bentley JP (2005). Principles of measurement systems.

LIST OF PRACTICAL ASSIGNMENTS:

- Based on Matlab toolboxes

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Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR5E4							
ARTIFICIAL INTELLIGENCE	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: To search and discover intelligent characteristics of existing AI projects, map a new problem – as search and create an animation – showing different search strategies for a problem, program a new game/ problem in Prolog, evaluate different Knowledge Representation schemes for typical AI problems, design and implement a typical AI problem to be solved Using Machine Learning Techniques, design and implement a futuristic AI application

Prerequisite: Basic Mathematics and Programming

COURSE CONTENTS

UNIT I Introduction

Introduction, Definition, Future of Artificial Intelligence, Characteristics of Intelligent Agents , Typical Intelligent Agents, Problem Solving Approach to Typical AI problems

UNIT II Problem solving methods

Problem solving Methods, Search Strategies, Uninformed, Informed, Heuristics, Local Search Algorithms and Optimization Problems, Searching with Partial Observations, Constraint satisfaction Problems, Constraint Propagation, Backtracking Search, Game Playing , Optimal Decisions in Games ,Alpha, Beta Pruning, Stochastic Games

UNIT III Knowledge representation

First Order Predicate Logic, Prolog Programming, Unification, Forward Chaining, Backward Chaining, Resolution, Knowledge Representation, Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information

UNIT IV Machine learning

Probability basics, Bayes Rule and its Applications, Bayesian Networks, Exact and Approximate Inference in Bayesian Networks, Hidden Markov Models, Forms of Learning , Supervised Learning, Learning Decision Trees, Regression and Classification with Linear Models, Artificial Neural Networks, Nonparametric Models, Support Vector Machines, Statistical Learning, Learning with Complete Data, Learning with Hidden Variables, the EM Algorithm, Reinforcement Learning

UNIT IV Introduction To Prolog

Introduction To Prolog: Syntax and Numeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and

Recursion, Property Lists and Arrays, Miscellaneous Topics, LISP and Other AI Programming Languages.

Learning Outcome:

After learning the course the students should be able to

- Understand various search methods
- Use various knowledge representation methods
- Understand various Game Playing techniques
- Use Prolog Programming language using predicate logic

BOOKS RECOMMENDED:

- [1].S. Russell and P. Norvig,Artificial Intelligence: A Modern Approach , Prentice Hall, 3 rd Edition, 2009
- [2] Bratko, I., Prolog Programming for Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th edition, 2011.
- [3].David L. Poole, Alan K. Mackworth , Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
- [4].Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009
- [5] William F. Clocksin, and Christopher S. Mellish, ”Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003

LIST OF PRACTICAL ASSIGNMENTS:

1. Write a program to implement Tic-Tac-Toe game problem.
2. Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem) .
3. Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
4. Write a program to implement Single Player Game (Using Heuristic Function)
5. Write a program to Implement A* Algorithm.
6. Write a program to solve N-Queens problem using Prolog.
7. Write a program to solve 8 puzzle problem using Prolog.
8. Write a program to solve travelling salesman problem using Prolog.
9. Write the Conceptual Dependency for following statements.
 - (a)John gives Mary a book
 - (b) John gave Mary the book yesterday

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Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR5E5							
POWER ELECTRONICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1 To prepare the students to analyze & design different power converter circuits.
- 2 To acquire knowledge about various application of power electronics.
- 3

Prerequisites: Basic Electronics

COURSE CONTENTS

UNIT-I Static Power Devices

Power semiconductor diodes & transistors, Thyristors, Construction, Characteristics, Ratings, Protection, Heating, Cooling, Mounting, Turn on methods, Gate characteristics, Firing circuits of thyristor, Introduction to other members of thyristor family like PUT, SUS, SCS, DIAC, TRIAC.

UNIT-II Converters

Thyristor commutation techniques, Phase controlled rectifiers, Principal of phase control, Full wave controlled converters, Single-phase full wave converters, Three-phase thyristor converter circuits, Basic principle & power circuit of Dual converter & AC voltage controller.

UNIT-III DC to DC Converter

Choppers: Basic principal of chopper operation, Control strategies, Step-up chopper, Different types of chopper circuits, Thyristor chopper circuits, Performance analysis.

UNIT-IV

Inverter

Single-Phase voltage source inverters, Principal of operation, Fourier analysis of single-phase inverters, Force-commutated thyristor inverters, Current source inverters, Pulse-width Modulated Inverters.

UNIT-V:

Industrial application of Power Electronics, SMPS, UPS, static switches, circuit breakers, solid state relays, concept of Electric drive.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Design the Inverter, chopper, rectifiers for high voltage.
- Apply design concepts for industrial applications.

BOOKS RECOMMENDED:

[1] Muhammad H. Rashid, *Power Electronics Circuits, Devices & Applications*, 3/e. 2004, PHI

[2] Cyril W. Lander, *Power Electronics*, 3/e.1993, The McGraw-Hill

[3] Dr. P.S. Bimbhra, *Power Electronics*, 4/e. 2006, Khanna Publishers

[4] P.C. Sen, *Power Electronics*,

[5] Ned Mohan, *Power Electronics, Converters, Application & Design*, 2/e. 1995, John Wiley

[6] Joseph Vithayathil, *Power Electronics, Principles & Applications*, 6/e. 2010, McGraw Hill

LIST OF PRACTICAL ASSIGNMENTS:

- 1 Study of SCR Characteristics
- 2 Study of DIAC Characteristics
- 3 Study of TRIAC Characteristics

- 4 Study of UJT Characteristics
- 5 Study of MOSFET Characteristics
- 6 Study of PUT Characteristics
- 7 Study of SCR Triggering Circuits
- 8 Study of Single Phase PWM Inverter
- 9 Study of Single Phase Controlled Rectifier
- 10 Study of Single Phase Cycloconverter
- 11 Study of Step-up Chopper
- 12 Study of Step-down Chopper
- 13 Study of SCR commutation Circuits
- 14 Study of Speed control of universal motor using SCR

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
STR5S5							
PRINCIPLES OF MANAGEMENT	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives: To provide engineering students with an accelerated introduction to the basics of management and the language of business.

- To provide a basis of understanding to the students with reference to working of Business Organizations through the process of Management.
- To inculcate the managerial skills and to teach how it can be executed in a variety of circumstances.

Prerequisites: Nil

COURSE CONTENTS

UNIT I Introduction to management and organisation

Basic concepts of management- definition, principles , levels and functions of management; Managerial roles and skills; Organization- meaning, types, business environment, efficiency and effectiveness.

UNIT II Planning

Nature and purpose of planning - types of planning, planning process, forecasting; Objectives-setting objectives, types of objectives; Decision making.

UNIT III Organising and staffing

Organization chart, Organization structures, departmentalization, span of control, delegation of authority- centralization and decentralization; Informal organization; process of Staffing.

UNIT IV Directing

Direction- meaning, process and components; motivation- theories of motivation; leadership- types and theories of leadership; communication- process, barriers and types.

UNIT V Controlling

Meaning and process of managerial control, techniques of control evaluation- budgetary and non-budgetary control techniques; Use of computers and IT in management control.

Learning Outcome:

At the end of the course, students should be able to do the following:

- Identify the key management processes and the relevance of management in organizations.
- Understand the key management skills required in organizations and how these might be applied.
- Evaluate their own managerial skills and the ways in which these might be developed.

BOOKS RECOMMENDED:

[1]. R.D Agrawal, Organization & Management.1/E PHI 1997.

[2]. Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition, 2012.

[3]. Dinkar Pagare, Principles of Management, Sultan Chand & Sons, 2000.

[4]. G.K.Vijayaraghavan and M.Sivakumar, Principles of Management, Lakshmi Publications, 5th Edition, 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR5G3							
DIGITAL SIGNAL PROCESSING	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives: To provide the analysis techniques like for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Prerequisite(s): Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

UNIT-I

Introduction to signal processing , Discrete time signals and sequence operations , Discrete time systems properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system .Frequency domain representation of discrete time signals and systems(DTFT), properties,Representation of sequences by Fourier transforms.

UNIT-II

Introduction to Z- transforms , properties , Inverse Z – transform, ,block diagram representation of linear constant coefficient difference equation,Signal flow graph representation of LCCDE, Basic structures for IIR systems ,Basic structures for FIR systems. Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals, properties,circular convolution ,linear convolution using DFT, Implementing LTIV systems using DFT.

UNIT-III

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms.

UNIT IV

Filter design techniques ,Design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing properties of commonly used windows.

UNIT V

Introduction of DSP Processor.Types of Digital signal processors , Applications.

Learning Outcome:

At the end of the course, students should be able to do the following:

- Analyze discrete-time systems in both time & transform domain and also through pole-zero placement.
- Analyze discrete-time signals and systems using DFT and FFT.
- Design and implement digital finite impulse response (FIR) filters.
- Design and implement digital infinite impulse response (IIR) filters.
- Understand and develop multirate digital signal processing systems.

BOOKS RECOMMENDED

[1] Oppenheim and Schaffer, Discrete time signal processing, 2/E PHI, 2005.

[2] Proakis and Manolakis, Discrete time signal processing, PHI, 2005.

[3] S. Mitra, Discrete time signal processing, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5L3	L	T	P	L	T	P	Total
SOFTWARE WORKSHOP	-	-	2	-	-	2	2
Only Practical examination will be held							

Learning Objective: To familiarize students about Java based application programs

Prerequisites: Basics of Java programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming, Java based application programs related to topics such as conditional statements, iteration statements with a focus on problems related to electronics and telecommunication.

UNIT-II

Introduction to string handling, Arrays, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-III

Introduction to Inheritance and Polymorphism, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-IV

Exception handling and Multi-threading, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-V

Java I/O, Applets and Event Handling, creating GUIs in AWT windows, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Write Java based application programs
- Learn to apply the concepts relating to various topics

BOOKS RECOMMENDED:

- [1] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [2] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [3] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

LIST OF PRACTICAL ASSIGNMENTS:

1. Write a program that converts inches to centimeters.
2. Write a program in which the program gives output numbers 1 to 10 along with their square roots
3. Write a program to find the average of five double numbers.
4. Write a program to determine the area of a sector of circle of radius r and angle subtended by the sector at the centre, a . The values of these variables are entered by the user
5. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
6. Write a program in which a sample of 8 random numbers is generated and an average value is determined by the user.
7. Make a program which uses a for loop to calculate and display squares and cubes of numbers from 1 to 8.
8. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
9. Write a program in which a sample of 8 random numbers is generated and an average value is determined.
10. Write a program in which a class is declared to deal with the characteristics of regular polygons and declare methods for determining area and perimeter. The length of the side and number of sides are declared public.
11. Write a program in which a method is declared to determine volume of a box with length, width and height as variables. The arguments should be passed on by reference.
12. Create a class Circle. Write a program to calculate:
 - `circumCircle()` - to compute the circumference of a circle.
 - `arcLength` – to compute the length of the arc for a given angle
 - Within the main method of the class Circle, create an object of the class Circle. Compute Circle's circumference when the radius is 10 and arc length when the angle is 45.
13. Write a program that declares an array of type double and finds out the square roots of the array elements.
14. Write a program to demonstrate the multiplication of two matrices.
15. Write a program in which method overriding is implemented. The super class declares two instance variables i.e. radius and height, and define a method to determine the volume. The sub class determines the volume of cone and cylinder.
16. Make program to determine the trigonometric functions `sin()`, `cos()` and `tan()` by using methods of Math class for angles 30, 60, and 90 degrees.
17. Declare an interface with a method to calculate volume with one double parameter. Implement the same for finding volume of sphere and volume of a cube.
18. Make an applet program to display strings in different colors.

COURSE SCHEME FOR B.E III YEAR-FULL TIME (CBCS)

Semester-V

CIVIL ENGINEERING DEPARTMENT

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	VLR5C1	DESIGN OF RCC STRUCTURES	PC	3-1-0	4
2	VLR5C2	FLUID MECHANICS	PC	3-1-1	4+1(P)
3	VLR5C3	QUANTITY SERVEYING & COSTING	PC	3-1-1	4+1(P)
4	VLR5EX	--	PE	3-1-1	4+1(P)
5	VLR5G3	WATER RESOURCES ENGINEERING	GE	3-1-0	4
6	VLR5L3	DESIGN SKILLS	--	0-0-1	1
7	SVR5S5	MANAGEMENT FOR ENGINEERS	--	2-0-0	2
8	VLR5V5	COMPREHENSIVE VIVA-V	Virtual L	0-0-4	4
TOTAL CREDITS					30

1	VLR5E1	GEOTECHNICAL ENGINEERING	PE	3-1-1	4+1(P)
2	VLR5E2	ADVANCE ROCK MECHANICS	PE	3-1-1	4+1(P)
3	VLR5E3	STRUCTURAL MECHANICS & VIBRATIONS	PE	3-1-1	4+1(P)
4	VLR5E4	PHYSICAL INFRASTRUCTURE	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India				III Year B.E. (Civil Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
VLR5C1: Design of RCC Structures – II	3	1	2	3	1	1	5
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

1. To bring about an understanding of the behavior of advanced reinforced concrete structures.
2. To bring about an understanding of the analysis and design philosophies for advanced reinforced concrete structures.
3. To perform analysis and design of advanced reinforced concrete members.

Prerequisites: Nil

COURSE CONTENTS

UNIT I

Design of Multistory Buildings - Sway and Non sway buildings, Shear walls and other bracing elements.

UNIT II

Earth Retaining Structures: Cantilever and counter fort types retaining walls.

UNIT III

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

UNIT IV

T-beam & Slab bridges- for highway loading (IRC Loads).

UNIT V

Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

Learning Outcomes: On completing the Course, the student will be able to:

- Understand the general behavior of advanced reinforced concrete structures.
- Understand the principles involved in analysis and design of advanced reinforced concrete Structures.
- Analysis and design of reinforced concrete Multistory Buildings.

- Analysis and design of retaining walls.
- Analysis and design of reinforced concrete Water Tanks.
- Analysis and design of reinforced concrete bridges.
- Understand the principles of prestressed concrete.
- Analysis and design of prestressed reinforced concrete members.
- To employ the code of practice for design of reinforced concrete structural members and elementary structural systems.

BOOKS RECOMMENDED:

- [1] Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
- [2] Advanced Reinforced Concrete Design by P.C.Varghese ; Prentice Hall of India, New Delhi
- [3] Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
- [4] Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
- [5] Design of concrete Structure – B.C. Punnia&A.K.Jain ; Laxmi publication
- [6] Advanced Reinforced Concrete Design by N.K.Raju;CBS publisher
- [7] Essentials of Bridge engineering – D.J. Victor
- [8] Bridge Engineering - Ponnuswamy

Devi Ahilya University Indore, India Institute of Engineering & Technology				III B.E. (Civil Engineering)				
Subject Code and Name		Instruction Hours Per Week			Credits			
VLR5C2: Fluid Mechanics - II		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 hours		3	1	2	3	1	1	5

Learning Objectives:

1. The course on fluid mechanics is devised to introduce fundamental aspects of fluid flow behavior.
2. Students will learn to develop steady state mechanical energy balance equation for fluid flow systems, estimate pressure drop in fluid flow systems and determine performance characteristics of fluid machinery.

COURSE CONTENTS

UNIT I

Turbulent flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Pipe flow problems: Losses due to sudden expansion and contraction, losses in pipe fittings and Valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, Pipes in parallel, branching of pipes. Pipe Network: *Water Hammer (only quick closure case). Transmission of power. *Hardy Cross Method

UNIT II

Uniform flow in open channels: Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its Computations, uniform flow and its computations, Chezy's and Manning's formulae, Determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Venet equation.

UNIT III

Non uniform flow in open channels: Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.

UNIT IV

Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, magnus effect.

UNIT V

Fluid Machines: Turbines: Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and Characteristic curves, cavitation. Pumps: Centrifugal pumps: Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, and principle of working

and characteristic curves. Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

Learning Outcomes:

- The student will understand stress-strain relationship in fluids, classify their behavior and also establish force balance in static systems. Further they would develop dimensionless groups that help in scale-up and scale-down of fluid flow systems.
- Students will be able to apply Bernoulli principle and compute pressure drop in flow systems of different configurations
- Students will compute power requirement in fixed bed system and determine minimum fluidization velocity in fluidized bed
- Students will be able to describe function of flow metering devices and apply Bernoulli equation to determine the performance of flow-metering devices
- Students will be able to determine and analyze the performance aspects of fluid machinery specifically for centrifugal pump and reciprocating pump

BOOKS RECOMMENDED:

- [1] 1.. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
- [2] Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New D
- [3] Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
- [4] Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak, Delhi-6
- [5] Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
- [6] Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
- [7] Engineering Hydraulics By H. Rouse
- [8] Centrifugal & Axial Flow Pump By Stemanoff A.J. New York
- [9] Relevant IS codes.

LIST OF PRACTICAL ASSIGNMENTS:

1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Caliration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hyd. Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface Profile over weir
7. Study of the characteristic of the Reciprocating pump

Devi Ahilya University Indore, India Institute of Engineering & Technology				III B.E. (Civil Engineering)				
Subject Code and Name		Instruction Hours Per Week			Credits			
VLR5C3: Quantity Surveying & Costing		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 hours		3	1	2	3	1	1	5

Learning Objectives:

Students will be able to:

1. Decide approximate cost of civil engineering structure.
2. Prepare check list of items of construction.
3. Prepare estimate for civil engineering work.
4. Prepare rate analysis of item of construction.
5. Take measurement of completed work.

COURSE CONTENTS

UNIT I

Introduction:

Purpose and importance of estimates, principles of estimating. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

UNIT II

Rate Analysis:

Importance, Task for average artisan, various factors involved in the rate of an item, material and labour requirement for different items of work; analysis of Rates for important items of work. Current schedule of rates. (C.S.R.)

UNIT III

Detailed Estimates:

Methods of taking out quantities of items of work. Long wall and Short wall method , Centre line method, Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads , Pitching of Slopes and estimating of culverts , Services for building such as water supply, drainage and electrification.

UNIT IV

Specification & Report Writing:

Specification – Necessity – Types of specifications – Essential requirements of specifications

Specifications for various items of works – steps involved in standard specification

Detailed project report.

UNIT V

Valuation and Rent fixation

Gross and net income – Market value – Book value – Scrap value – Salvage value – Capitalized values – sinking fund – depreciation – Valuation of a building – Rent fixation of buildings.

Learning outcomes:

- Discuss contemporary issues affecting the role of the consultant quantity surveyor throughout the construction process.
- Select appropriate tendering arrangements and contract procurement methods to ensure that the contract is placed in the most appropriate manner. This also involves evaluating tenders received.
- Appraise cost management theories and evaluate techniques employed by the quantity surveyor during the precontract stage of the construction process
- Select appropriate cost advice and cost planning strategies and techniques to enable building work to be designed within agreed expenditure limits.
- Appraise the purpose and content of the range of tender and contract documents to enable competitive tenders to be obtained

BOOKS RECOMMENDED:

- [1] IS Code of Practice – IS 1200
- [1] Civil Estimating, Casting and Valuation – Kalson Publication Ludhiyana.
- [2] Rangawala, ” Estimating & Casting, Charotor Publishing, 8th Edition,1990.
- [3] N.A.Shaw, ” Quantity surveying & Valuation”, Khana Publishers,2001.
- [4] PL Bhasin, ” Quantity Surveying” S. Chand & Co. IIIrd Edition,1992.
- [5] L.N.Dutta, Estimating and Costing, Dhanpat Rai & sons, IInd Edition,1986.
- [6] Bridie, “Estimating and Costing”,1989.
- [7] Vazirani & Chandolu, ” Estimating and Costing” 2001.

LIST OF PRACTICAL ASSIGNMENTS:

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project

Devi Ahilya University Indore, India Institute of Engineering & Technology				III B.E. (Civil Engineering)			
Subject Code and Name	Instruction Hours Per Week			Credits			
VLR5E1: Geotechnical Engineering-I	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 hours	3	1	2	3	1	1	5

Learning Objectives:

1. In depth understanding of specialist bodies of knowledge within the engineering discipline.
2. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.
3. Application of established engineering methods to complex engineering problem solving.
4. Fluent application of engineering techniques, tools and resources.

COURSE CONTENTS

UNIT I

Definition and scope of soil mechanics, soil origin and it's composition, influence of clay minerals on engineering behavior. Soil texture and structure. Three phase system, index properties and their determination. Classification systems based on particle size, texture, consistency limits unified and AASHTO. Details of it's classification.

UNIT II

Soil properties, density, void ratio porosity, moisture- content, grain size analysis. Dry and wet sieve analysis and sedimentation soil consistency. Atterberg Limits, explanation of various indices like Flow-Index, plasticity- index, toughness index, liquid index, activity ratio.

UNIT III

Capillary and gravitational water. Permeability of soil, Darcy's law, laboratory determination of permeability and affecting factors. Seepage and flow net, effective neutral and total pressure, quick sand phenomenon. Compaction characteristics of soil, moisture/density relationship, factor affecting compaction and control. Compressibility and consolidation of soil, Terzaghi's one Dimensional Consolidation theory, pressure valid ratio relationship.

UNIT IV

Strength of soils, stress distribution beneath loaded areas by Boussinesq and water guard's analysis, Newmark's influence chart, contact pressure distribution Mohr-coulomb's theory of shear failure of soils. Measurement of shear strength. Shear box test, triaxial and unconfined compression test, vane shear test. Measurement of pore pressure parameters, critical void ratio, liquefaction.

UNIT IV

Stability of slopes, infinite and finite slopes, types of slope failures, rotational slips, stability number, effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis, stability of earth dams.

Learning outcomes:

- Define geotechnical engineering, determine soil physical characteristics (including unit weight/ density - water content relationship), classify soils and describe field compaction methods and related quality control.
- Determine the coefficient of permeability and equivalent hydraulic conductivity in stratified soil (according to established scientific principles for the flow of water through saturated soils) and calculate seepage, pore water pressure distribution, uplift forces and seepage stresses for simple geotechnical systems.
- Describe the purposes and different phases of a soil investigation, soil exploration program, soil exploration methods and soil identification in the field.
- Discuss the concept of effective stress and determine stress distribution within a soil mass.
- Explain the 'shear strength' of soil, describe the direct shear test method and interpret direct shear test results.
- Calculate the bearing capacity of shallow foundations and factor of safety.
 1. Determination of plastic limit and shrinkage limit of soil.
 2. Determination of permeability of soil by:
 - (a) constant head method (b) variable head method
 3. Determination of OMC of soil by Standard proctor compaction test.

BOOKS RECOMMENDED:

- [1] Soil Mech. & found. By Dr. B.C. Punmia Lakshmi Publications, Delhi
- [2] Modern Geotech Engg. By Dr. I Aram Singh- IBT Publishers Delhi
- [3] Geotech. Engg. By C Venkatramaiah- New Age International Publishers, Delhi
- [4] Soil Testing for Engg. By T.W. Lambe- John Wiley and Sons. Inc
- [5] Soil Mech. & Found. By S.K. Garg-Khanna Publishers, Delhi
- [6] Geotechnical Engineering- Shashi.k.Gulhati & Manoj Datta- MC Craw Hill Education(India) Pvt. Ltd. New Delhi

LIST OF PRACTICAL ASSIGNMENTS:

1. Determination of moisture content of soil
2. Determination of specific gravity of soil
3. Determination of field density by sand replacement method
4. Determination of field density by core cutter method
5. Sieve analysis of soil and sedimentation analysis
6. Determination of liquid limit of soil by Casagrande method and cone penetrometer

Devi Ahilya University Indore, India Institute of Engineering & Technology			IIIB.E.(Civil Engg) (Full Time)				
Subject Code and Name	Instruction Hours Per Week			Credits			
VLR5G3: Water Resources Engineering	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 hours Hours							

Learning Objectives:

1. The knowledge of hydrology is prerequisite for the irrigation engineering and also for design of hydraulic structure. So one of the objective of this course is to impart the knowledge of hydrology that deals with the occurrence, distribution, movement and properties of water on the earth
2. To impart the knowledge of various irrigation techniques, requirements of the crops,
3. To learn about distribution systems for canal irrigation, design of unlined and lined irrigation canals design sediment problems associated with canal

COURSE CONTENTS

UNIT I

Irrigation Water Requirement and Soil-Water-Crop Relationship:

Irrigation, definition, necessity, advantages and disadvantages, types and methods, Irrigation development.

Soils - Types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

UNIT II

Ground Water and Well Irrigation:

Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge, necessity and methods of improving ground water storage.

Water logging- causes, effects and its prevention. Salt efflorescence causes and effects. Reclamation of water logged and salt affected lands.

Type of wells, well construction, yield tests, specific capacity and specific yield, advantages and disadvantages of well irrigation.

UNIT III

Hydrology :

Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

UNIT IV

Canals and Structures:

Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, lining-objectives, materials used, economics. Introductions to Hydraulic Structures viz. Dams, Spillways, Weirs, Barrages, Canal Regulation Structures.

UNIT V

Floods : Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control,

Learning Outcomes:

- Various components of hydrologic cycle that affect the movement of water in the earth
- Various Stream flow measurements technique
- the concepts of movement of ground water beneath the earth
- the basic requirements of irrigation and various irrigation techniques, requirements of the crops
- Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design
- Basic components of river Training works. CO- 7 Apply math, science, and technology in the field of water resource

BOOKS RECOMMENDED:

- [1] Irrigation & Water Power Engg. by Punmia & Pandey B.B.Lal
- [2] Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
- [3] Engg. Hydrology - J.NEMEC - Prentice Hall
- [4] Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
- [5] Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
- [6] Engg. Hydrology by H.M. Raghunath G

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (CIVIL)			
Subject Code & Name	Instructions Hours per Week			Credits			
SVR5S5: MANAGEMENT FOR ENGINEERS	L	T	P	L	T	P	Total
		2	-	-	2	-	-
Duration of Theory Paper: 2 Hours							

Learning Objective:

1. Understanding Management Concepts.
2. Acquire the knowledge of business environment.
3. Managing behaviour of human at organizations with modern management concepts.
4. Understanding business ethics and social responsibility as Engineers.
5. To develop the capacity to lead in a variety of circumstances.

Prerequisites:Basics of management

COURSE CONTENTS

UNIT I Introduction of management

Basic concepts of management: Definition, Essence, Principles, Roles, Level; Functions of management: Planning, Organizing, Staffing, Directing, Coordinating and controlling; Organizational efficiency & effectiveness; Roles of manager, Skills required in a manager.

UNIT II Management and society

Organization: Types and Structure; Business environments: Political, Economic, Legal, Social, Technological and International environment; Designing effective organization: Span of management, Delegation, Centralization and Decentralization; Formal and Informal organization.

UNIT III Management of human at work

Human Resource Development: Interrelationship of managerial function; significance of staffing, Personnel management: Recruitment, Training, Performance appraisal, Employee retention; Managerial communication; Motivating individuals and work groups, Leadership for managerial effectiveness.

UNIT IV Management ethics for engineers

Business ethics, Social responsibility of Business: Economical, Legal, Ethical and Philanthropic; Ethical responsibilities of Engineers toward society; Business and environment protection; Impact of engineering on society.

UNIT V Modern management concepts

MBO: Principles, steps, advantages and disadvantages; Strategic management-SWOT analysis; Team Building: Definition of Team, Team Formation, Approaches, Goal

Setting and Communication among Team Members. Models of relationship between professional and client.

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Identify the key management processes and the relevance of management in organisations.
- Understand the key management skills required in organisations and how these might be applied.
- Evaluate their own managerial skills and the ways in which these might be developed.
- Understand Team members while working with people from different background.

BOOKS RECOMMENDED:

- [1]. R.D Agrawal, Organization & Management.1/E PHI 1997.
- [2]. Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition, 2012.
- [3]. Dinkar Pagare, Principles of Management, Sultan Chand & Sons, 2000.
- [4]. G.K.Vijayaraghavan and M.Sivakumar, Principles of Management, Lakshmi Publications, 5th Edition, 2009.
- [5]. Harold Koontz & Heinz Weihrich, Essentials of Management – An International perspective,8th edition. Tata McGraw-Hill, 2009.
- [6]. Charles W.L. Hill and Steven L McShane, Principles of Management, Tata Mc Graw-Hill, 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Civil) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR6C1 Structural Analysis - I	L	T	P	L	T	P	Total
	3	1	0	-	-	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To understand the concept of determinate and indeterminate structures, analyses of determinate and indeterminate structures.
2. To understand the principle of virtual work and the application of influence line diagrams in structural analysis problems.

Prerequisite(s): Mechanics of Materials.

COURSE CONTENTS

UNIT I

Fundamental Concepts In Structures:

Definition and Determination of Static and Kinematic Indeterminacy , Beams, Trusses and Frames , Degree of Freedom, Equilibrium and Kinematic Stability , Principle of Superposition , Basic Methods of Structural Analysis. **Virtual work and Energy Principles:** Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

UNIT II

Slope Deflection Method:

Analysis of Continuous beams and Rigid plane frames with and without sway. Moment Distribution Method: Stiffness and Distribution factors, Carry over factors, Analysis of Continuous beams, Plane rigid frames with and without sway Kani's method and Column analogy method applied to indeterminate beams.

UNIT III

Moving Loads And Influence Lines

Effect of moving load , Description of Influence line , Influence line for Reaction, Shear Force and Bending Moment , Load position , Absolute maximum bending

moment , Muller Breslau's Principle , Application to beams with one degree of indeterminacy , Influence line for forces in members of determinate trusses.

UNIT IV

Analysis of Three Hinged and Two Hinged Arches :

Parabolic and Circular principles of analyzing Fixed Arches, Influence lines for Three and Two hinged arches for Horizontal thrust, Shear force and B.M. at any section , absolute maximum bending moment, axial thrust **Suspension bridges:** Length of Cable, Maximum tension ,Types of supports, Forces in Towers,two hinged and three hinged stiffening girders, influence line diagrams for bending moment

UNIT V

Indeterminate Trusses :

Energy method , application to analysis of indeterminate pin jointed Plane trusselackoffittemperatureeffects.

Learning Outcomes:

At the end of the course, the student will be able to:

- Analyze one dimensional and two dimensional problems using classical methods
- Analyze indeterminate structures
- Analyze structures for gravity loads, moving loads and lateral loads

BOOKS RECOMMENDED:

- [1] Menon, D., "Structural Analysis", Alpha Science International, Limited, 2008.
- [2] Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Theory of Structures", Laxmi Publications, New Delhi, 12th Edition, 2004.
- [3] Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
- [4] Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
- [5] Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
- [6] Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- [7] Pandit .G.S, "Theory Of Structures", Vol-I, McGraw-Hill Education (India) PvtLimited, 1999.
- [8] Norris C.H., Wilbur J.B. and Utku. Elementry Structural Analysis, McGraw Hill International, Tokyo
- [9] Timoshenko. S.P & Young. D.H, "Theory of Structures",. McGraw Hill Book Company, International Ed. 1965.

COURSE SCHEME FOR B.E III YEAR-PART TIME (CBCS)
MECHANICAL ENGINEERING DEPARTMENT

Semester-V

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	MEP5C1	DYNAMICS OF MACHINES	PC	2-1-1	4
2	MEP5C2	HEAT RANSFER	PC	2-1-1	4
3	MEP5C3	IC ENGINE AND JET PROPULSION	PC	2-1-1	4
4	MEP5G1	MACHINE DESIGN I	GE	2-1-0	3
5	MEP5V5	COMPREHENSIVE VIVA - V	VIRTUAL	0-0-4	4
TOTAL CREDITS					15(A)+4(V)

Devi Ahilya University, Indore, India				III Year B.E. (Mechanical Engg.)					
Institute of Engineering & Technology				(Part Time)					
Subject Code & Name		Instructions			Credits				
		Hours per Week							
		L	T	P	L	T	P	Total	
MEP5C1		OF	2	1	1	2	1	1	4
DYNAMICS									
MACHINE									
Duration of Theory Paper:									
3 Hrs									

Learning Objectives:

1. To make students to understand the concept of development of forces in various machines/mechanisms.
2. To develop the understanding of the effects and their consequences on mechanism / machines.
3. To make them able to determine this forces and to develop the various methods to counter this forces.

Prerequisite(s): Theory of Machines, Strength of Materials, Applied Mathematics.

COURSE CONTENTS

UNIT-I

Friction in Screw threads: Screw Frictions and Screw jack.

Friction in Bearings: Pivot and Collar Bearings, Journal Bearings, Thrust Bearings, Ball and Roller Bearings.

Friction in Clutches: Single & Multi-plate Clutch, Cone clutch, Centrifugal Clutch.

Friction Drives: Belt, Rope and Chain Drives

UNIT-II

Brakes: Introduction, Classification and Types of Brakes, Shoe/Block Brake, Band Brake, Band and Block Brake, Internal Expanding Shoe Brake, Disc Brake. **Dynamometer:** Introduction, Classification and Types of Dynamometers. Propulsions and Breaking of Vehicles.

UNIT-III

Dynamic Force Analysis: Inertia Force and Inertia Torque, D. Alembert's Principle.

Dynamic Analysis in Reciprocating Engines: Gas Forces, Equivalent masses, Piston Efforts, Crank shaft Torque, Turning moment diagrams, Fly wheels, fluctuation of energy and speed.

UNIT-IV

Governors: - Introduction, Types and Classifications, Centrifugal Governors, Gravity Controlled and Spring Controlled Governors, Inertia Governors, Governor Characteristics and Effect of friction.

UNIT-V

Balancing of Rotating Masses: Static and Dynamic Balancing, Balancing a Single Cylinder

Engine, Balancing Multi-Cylinder Engines

Balancing of Reciprocating Masses: Primary and Secondary Balancing, Locomotive Balancing, Hammer Blow, Pitching and Swaying Couples, Conditions of Balance in V-Engine, Radial Engine and Multi-Cylinder in line Engines.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Determine the Forces and Torques due to Friction in Bearings, Clutches and Belt Drives.
- Determine the Forces and Torques due to Friction in Brakes and Vehicle Propulsion.
- Determine the Forces and Torques in Reciprocating Engines.
- Determine the Forces and Torques in Governor Mechanisms.
- Determine the unbalancing Forces / Torques in Engines and Machines and to balance this Forces/Torques.

BOOKS RECOMMENDED:

- [1] Rattan S.S., *Theory of Machines*, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Reprint 2005.
- [2] Shigley J.E. and Uicker J.J., *Theory of Machines and Mechanisms*, McGraw Hill, Inc., 1995.
- [3] Thomas Bevan, *Theory of Machines*, CBS Publishers and Distributors, 1984.
- [4] Ghosh A. and Mallick A.K., *Theory of Mechanisms and Machines*, Affiliated East-West Press Pvt.Ltd., New Delhi, 1988.
- [5] Rao J.S. and Dukkupati R.V., *Mechanism and Machine Theory*, Wiley-Eastern Limited, New Delhi, 1992.
- [6] John Hannah and Stephens R.C., *Mechanics of Machines*, Viva low-Priced Student Edition, 1999.

LIST OF PRACTICAL ASSIGNMENTS:

1. To determine the coefficient of friction between the surfaces of different materials by inclined plane method.
2. To determine coefficient of friction between leather belt and CI pulley by Simple & differential band brake method.
3. To determination the coefficient of friction between leather belt and wooden pulley by belt and pulley apparatus.
4. To determine the pressure distribution in the oil film of the journal bearing for various speeds and plot the curves, determine total load and tractional torque.
5. To determine the moment of inertia of objects using trifilar suspension method.

Devi Ahilya University, Indore, India				III Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Part Time)			
Subject Code & Name	Instructions			Credits			
	Hours per Week						
MEP5C2	L	T	P	L	T	P	Total
HEAT TRANSFER	2	1	1	2	1	1	4
Duration of Theory Paper: 3 Hrs							

Learning Objectives:

- 1 To make a fundamentally strong base theory of heat transfer.
- 2 To understand different modes of heat transfer.
- 3 To model and simulate heat transfer phenomenon.
- 4 To extend the theory of heat transfer equipment.

Prerequisite(s): Fluid Mechanics, Engineering Thermodynamics, Applied Mathematics.

COURSE CONTENTS

UNIT- I Steady State Heat Conduction:

One Dimensional Heat Conduction Equation, General Heat Conduction Equation, Heat Conduction in Cylinders and Spheres, Heat generation in Plane wall and cylinders, Variable Thermal Conductivity, Thermal Contact Resistance, Illustrative Problems

UNIT- II Heat Transfer from Extended Surfaces and Transient Heat Conduction:

Steady flow of heat along a rod, Governing differential equations and its solutions, Heat dissipation from infinitely long fin, Heat dissipation from fin having insulated tip, Fin performance, Critical Radius of Insulation, Lumped System Analysis, Transient Heat Conduction in Large Plane Walls and Long Cylinders, Illustrative Problems

UNIT- III Fundamentals of Convection:

Physical Mechanism on Convection, Velocity Boundary Layer and Thermal Boundary Layer , Derivation of Differential Convection Equation, Natural Convection over Surfaces, Natural Convection from Finned Surfaces and PCBs, Forced Convection across Cylinders, Spheres and Tube Banks, Combined Natural and Forced Convection.

UNIT-IV Fundamentals of Thermal Radiation:

Introduction, Radiative Properties, View Factor Relations, Radiation Heat Transfer, Radiation Shields and the Radiation Effects.

UNIT- V Heat Exchangers:

Classification of Heat Exchangers, Nature of Heat Exchange process, Mechanical design of heat exchange surfaces, Performance analysis, Overall heat Transfer Coefficient, Effectiveness-NTU method, Cooling of Electronic Equipments, Illustrative Problems.

Learning outcomes:

Upon Completing the Course, Student will be able to:

- List and Tabulate the Temperature Measuring Devices.
- Determine the thermal conductivity of an insulating powder.
- Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
- Effectiveness and efficiency of pin fin by using pin fin apparatus
- Determine and verify the value of Stefan Boltzmann constant experimentally..
- Determine the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger.
- Determine the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchanger

BOOKS RECOMMENDED

- [1] Cengel YA.,Heat Transfer-A Practical Approach, Tata McGraw Hill, New Delhi 2e,2002.
- [2] Rudramoorthy R. Heat Transfer-Theory and Problems ,Pearson Education, New Delhi, 2006
- [3] Christopher A, Essential Heat Transfer, Pearson Education, New Delhi, 2001.
- [4]Nag,P.K., Heat Transfer, Tata McGraw Hill, New Delhi, 1e , 2006.

LIST OF PRACTICAL ASSIGNMENTS:

- 1 List and Tabulate the Temperature Measuring Devices
- 2 To determine the thermal conductivity of an insulating powder

- 3 To Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
- 4 To determine the Effectiveness and efficiency of pin fin by using pin fin apparatus
- 5 To Determine and verify the value of Stefan Boltzmann constant experimentally
- 6 Determining the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger
- 7 Determining the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchanger.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.)				
				(Part Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
MEP5C3: JET IC ENGINES AND PROPULSION		L	T	P	L	T	P	Total
		2	1	1	2	1	1	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

- 1 To make students to understand principal and working of Engines and Turbines
- 2 To develop the understanding of the effects of fuel combustion on environmental pollution.
- 3 To make students to understand principal and working of different systems used in IC Engines and Jet Propulsion.
- 4 To make them able to understand the testing performance parameters and various testing methods to determine these parameters of IC Engines and Jet Propulsion.
- 5 To understand the latest trends in IC Engines.

Pre requisite(s):

- Applied Thermodynamics, Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT-I

Introduction to I.C. Engine & Fuels:

Air standard cycles, Otto, Diesel, Stirling, Ericsson cycles,
 Engine classification- Two and four stroke-SI and CI engines, Stirling engine, Rotary engines, Stratified charge engine, Variable compression ratio engine. Valve timing diagram,
 Fuels: Fuels for SI and CI engine, important qualities of SI engine fuels, important qualities of CI engine fuels, dopes, additives, gaseous fuels, LPG, CNG, biogas, alternative fuels.

UNIT-II

SI Engine:

Carburetion, mixture requirements and thermochemistry of petrol fuel, Carburetor types, theory of carburetor, Calculation of air /fuel ratio supplied by carburetor, MPFI System (petrol injection). Combustion in SI engine, flame Speed, ignition delay, abnormal combustion and its control, combustion chamber design for SI engines. Ignition system

requirements, battery ignition systems, magneto ignition system, electronic ignition system, ignition timing, firing order and spark plugs, variable valve control- VVC, VVA, VVE, VVS VTC, VTEC, VTEC-E, i -VTEC, AVTEC, SI Hybrid Engine.

UNIT-III

CI Engine:

Requirements of Fuel injection in CI engines, types of diesel fuel injection systems (Mechanically controlled and electronically controlled), fuel pumps, fuel injectors, injection Timings. Fuel injection computation in CI Engines, Combustion in CI engines, ignition delay, knock and its control, combustion chamber design of CI engines. Scavenging in 2 stroke engines.

UNIT-IV

Engine Cooling, Lubrication, Supercharging & Testing:

Engine Cooling: Different cooling systems, radiators and cooling fans, Lubrication: Total Engine friction, lubrication principle, lubricating oils, type of lubricating systems, Testing and Performance: Performance parameters, basic measurements, testing of SI and CI engines and calculation of performance parameters.

Supercharging: Effect of altitude on power output, Types of supercharging and turbocharging and effects on engine performance.

New Technologies of Engines- **Cylinder Deactivation**, Camless engines, DI Turbo Ethanol engine, KERS, HCCI, OPOC, and IC Engine with oscillating shaft.

UNIT-V

Compressors, Gas Turbines & Jet Propulsion:

Dynamic Compressors- Centrifugal compressor and Axial Flow Compressor- elementary theory, vector diagram efficiencies, and performance analysis and curves, Losses in dynamic compressors, surging and stalling,

Gas Turbines: Introduction, Classification and Application, Gas turbine main components, , Optimum pressure ratio for maximum specific output and thermal efficiency in actual gas turbine cycle, Air rate and work ratio, Open cycle Gas turbine with Regeneration , Reheat and Intercooling, Effect of operating variables on thermal efficiency.

Jet Propulsion- Turbo jet, Turbo fan, Turbo Prop, Ram jet, Rocket engines, thrust power, propulsive efficiency and thermal efficiency, Jet propulsion performance, Specific thrust and specific fuel consumption in each case for turbo jet and turbo propulsion units.

Learning Outcomes:

- Upon Completing the Course, Student will able to:
- Determine the air fuel ratio supplied by carburettor and MPFI system.
- Determine the thermochemistry of fuels.
- Design and select the combustion chambers of SI Engines.
- Draw the valve timing diagram of SI Engines(Two and Four Stroke).
- Determine the Torque/Mean effective pressure / BHP/FHP/IHP/volumetric efficiency/Brake thermal efficiency/Specific fuel consumption and other parameters of engines.

- Determine the performance parameters of Centrifugal compressors, gas turbine, air crafts and rocket engines.

BOOKS RECOMMENDED

- [1] Mathur & Sharma, “Internal combustion Engines”, Dhanpat Rai Publications, 2007.
- [2] Ganeshan V “Internal Combustion Engines”, Tata Mc Graw Hill Publication, 1992.
- [3] Heywood J. B, “Internal Combustion Engine Fundamentals”, Mc Graw Hill, 1988.
- [4] Khajuria P.R., Dubey S.P., Gas Turbines & Propulsive Systems, Dhanpat Rai Pub, 2005
- [5] Sarvanamatto, Cohen H, Rogers, “Gas Turbine Theory”, Longmans Green, 1996
- [6] Yahya S. M., “Turbines, Compressors and Fans”, Tata McGraw Hill Publications, 1996
- [7] Dr. R. Yadav, “Steam and Gas Turbines”, Central publishing House, 2015
- [8] Dr. R. Yadav, Applied Thermodynamics, Central Publishing House, 2012
- [9] Ganesan V. Gas Turbines, Tata McGraw Hill Publications, 1999

LIST OF PRACTICAL ASSIGNMENTS

- 1 To Study of carburettor, Induction system and combustion chamber in petrol engine
- 2 To study of MPFI systems and performance testing on MPFI SI engine.
- 3 To study of fuel injection systems and its components in diesel engines.
- 4 To study the Battery ignition system, Magneto ignition system and Electronic ignition system
- 5 To Study of Water Brake Dynamometer with Four Stroke Four Cylinder S. I. Engine.
- 6 Performance testing of Four Stroke Four Cylinder S. I. Engine.
- 7 To Study of Swinging Field Electrical Dynamometer with twin cylinder Four Stroke Diesel Engine.
- 8 Performance testing of Four Stroke Four Cylinder C. I. Engine.
- 9 To Study of Engine Cooling and Lubrication Systems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MEP5G1							
MACHINE DESIGN I	2	1	0	2	1	0	3
Duration of Theory Paper: 4 Hours							

Learning Objectives:

- 1 To introduce the students about the concept and importance of the design (A decision making)
- 2 To give the concept about the theories of failures and importance of material's selection in design
- 3 To give the concepts about the design of basic mechanical components like springs, rotating elements etc.

Pre requisite(s):

- Theory of Machines, Strength of Materials, Material Science.

COURSE CONTENTS

UNIT-I

Theory of Failures & Applications:

Theories of failure, their applications to the design problems. Design of parts subjected to torsional and/ or bending such as spiral, helical and leaf springs.

UNIT-II

Pressure Vessels and Cover Plates:

Analysis of thick cylindrical and spherical shells, compound cylinders, joint for steam and hydraulic pipes, parts of press fit and shrink fit, design consideration of pressure vessels and cover plates.

UNIT-III

Rotating Rings and Disks:

Disk of uniform thickness and disk of uniform strength. Effect of drilled hole and extra mass, design of flywheel and pulleys.

UNIT-IV

Design Analysis of Curved Machine Members:

Crane Hook, Chain link, open and closed links, M/c. Frames, Wall brackets, design and selection of hooks and wire ropes.

UNIT-V

Experimental Methods in Design:

Brief idea about experimental stress analysis techniques and their applications and limitation.

Note: Only Mechanical Engineer's Handbook, Data-books and Certified notes are allowed in the examination hall.

Learning Outcomes:

After Completing the Course, Student will be able to:

- Have the importance, role and concept of design
- Learn to apply the knowledge of material science in real life situations.
- Design the basic machine elements like spring, cylinder etc.
- Know about the latest stress analysis techniques

BOOKS RECOMMENDED:

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003.
- [2] Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2006
- [3] Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2006
- [4] Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications(P) Ltd., 3e, 1995

COURSE SCHEME FOR ME III YEAR-PART TIME (CBCS)

SEM V

Software Engineering

Sub Code	Sub Name	L-T-P	
SEP5D1	Dissertation Phase I	0-0-12=12	
SEP5V5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V		12 actual + 4 Virtual credits	

COURSE SCHEME FOR ME III YEAR-PART TIME (CBCS)

SEM-V Information Security

Sub Code	Sub Name	L-T-P	
ISP5D1	Dissertation Phase I	0-0-12=12	
ISP5V5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V		12 actual + 4 Virtual credits	

COURSE SCHEME FOR ME III YEAR-PART TIME (CBCS)

SEM-V Digital Instrumentation

Sub Code	Sub Name	L-T-P	
DIP5D1	Dissertation Phase I	0-0-12=12	
DIP5V5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V		12 actual + 4 Virtual credits	

COURSE SCHEME FOR ME III YEAR-PART TIME (CBCS)

SEM-V Digital Communication

Sub Code	Sub Name	L-T-P	
DCP5D1	Dissertation Phase I	0-0-12=12	
DCP5V5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V		12 actual + 4 Virtual credits	

COURSE SCHEME FOR ME III YEAR-PART TIME (CBCS)

SEM-V Industrial Engineering & Management

Sub Code	Sub Name	L-T-P	
IMP5D1	Dissertation Phase I	0-0-12=12	
IMP5D5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V		12 actual + 4 Virtual credits	

COURSE SCHEME FOR ME III YEAR-PART TIME (CBCS)

SEM-V Thermal and Design Engineering

Sub Code	Sub Name	Credits L-T-E	
DTP5D1	Dissertation Phase I	0-0-12=12	
DTP5V5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V		12 actual + 4 Virtual credits	

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 29/12/2017

1. Department heads presented the syllabus and scheme of 6th Sem. Committee has approved the syllabus and scheme of 6th Sem, after thorough discussion, for following branches of BE, BE (Part Time- Mechanical), ME (Part Time);

- BE Mechanical Engineering
- BE Computer Engineering
- BE Electronics & Instrumentation Engineering
- BE Information Technology
- BE Electronics & Telecommunication Engineering
- BE Civil Engineering
- ME Computer Engineering with specialization in *Software Engineering*
- ME Information Technology with specialization in *Information Security*
- ME Electronics Engineering with specialization in *Digital Instrumentation*
- ME Electronics Engineering with specialization in *Digital Communication*
- ME Industrial Engineering & Management
- ME Mechanical Engineering with specialization in *Thermal & Design Engineering*
- Syllabus for advanced course work for 06 Ph.D. programs is approved. It was decided that students of Applied Physics and Applied Chemistry will study the advanced course in School of Physics and School of Chemistry respectively.



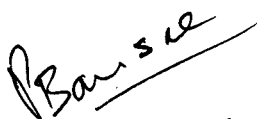
Dr. Paresh Atri



Dr. Nagendra Sohani



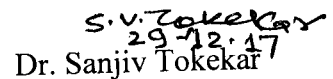
Dr. Govind Maheshwari



Dr. Pratosh Bansal



Dr. Ashesh Tiwari



S.V. Tokekar
29.12.17

Dr. Sanjiv Tokekar

Semester Wise Scheme & Syllabus Of B.E Programme

SEMESTER - VI B.E MECHANICAL ENGINEERING

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	MER6C1	MACHINE DESIGN-II	PC	3-1-0	4
2	MER6C2	PRODUCTION ENGINEERING-II	PC	3-1-1	4+1(P)
3	MER6C3	FLUID MACHINES	PC	3-1-1	4+1(P)
4	MER6C4	ENERGY CONVERSION SYSTEM	PC	3-1-1	4+1(P)
5	MER6G1	MATERIALS MANAGEMENT	GE	3-1-0	4
6	SMR6S6	ENTREPRENEURSHIP DEVELOPMENT & IPR	-	2-0-0	2
7	MER6L4	WORKSHOP/ PRACTICAL (MACHINE DESIGN-II)	-	0-0-1	1(P)
8	MER6V6	COMPREHENSIVE VIVA-VI	VIRTUAL	0-0-4	4
		TOTAL CREDITS			30

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Mechanical Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6C1 MACHINE DESIGN-II	L	T	P	L	T	P	Total
Duration Of Theory Paper: 4	3	1	0	3	1	0	4

Learning Objectives:

- To provide the knowledge of fundamentals of designing the Mechanical Components.
- To introduce the designing of Internal Engine Components.
- To develop skill to analyze the component under dynamic loading.
- To introduce the importance of seals & gasket in Engine.

Prerequisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

UNIT-I

Design of Power Transmission Elements: Design for single plate clutch, cone clutch, centrifugal clutch, flat belt, V belt, power screw, spur gear, helical gear and Bevel gear.

UNIT-II

Design for Dynamic Loading: Stress concentration factor, design of parts subjected to Fatigue loading.

UNIT -III

Design for Brakes: Design of shoe brakes, band brakes, block brakes, internal expanding brakes and disc brakes.

UNIT-IV

Design for Internal Combustion Engine Parts: Design for Engine cylinder, piston, connecting rod

UNIT-V Design of Crank Shaft, Concept of Seals and Gasket: Design of crank shaft, valves and valve gear mechanism Brief Introduction about seals and gasket.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Design the various components of Internal Combustion Engine.
- Design the components under Dynamic Loading.
- Understand the applications of seals & gaskets.
- The different types of failure mode in mechanical components.

BOOKS RECOMMEDED:

- [1]. Shigley J.E., *Mechanical Engineering Design*, McGraw-Hill 2015.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2007.
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2013
- [4]. Bhandari V.B., *Design of Machine Elements*, McGraw-Hill, 4e, 2017
- [5]. Black and Adams, *Machine Design*, McGraw-Hill, 1968
- [6]. Maleev V.L., *I.C. Engine Design*, McGraw-Hill, 1945

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Mechanical Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6C2 PRODUCTION ENGINEERING-II	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- To provide an understanding of the mechanics of metal cutting and various aspects of machinability and tool wear.
- To learn about the fundamentals of bulk metal forming processes.
- To learn about the various unconventional machining processes.
- To learn about the various methods to evaluate and measure the surface finish and methods to improve the surface finish of engineering components.
- To learn about the methods to process particulate materials and composites.

Prerequisite(s): A basic course in manufacturing processes and workshop practice.

COURSE CONTENTS

UNIT-I

Theory of Metal Cutting: Introduction, mechanics of metal cutting, oblique and orthogonal cutting, shear angle, rake angle and strain relationships, force and power relationships, heat generation and temperature rise in metal cutting. **Machinability:** criteria for evaluating machinability, factors affecting machinability, tool life and tool wear, variables influencing tool life, economics of metal cutting.

UNIT-II

Theory of Metal Forming: Introduction, plastic deformation and yield criteria, temperature and friction in metal forming, overview of bulk metal forming processes, mechanics of forming processes:

rolling, forging, drawing, bending, extrusion; design consideration for the tooling/dies used in solid forming processes, defects in metal forming, advantages & limitations of hot & cold forming.

UNIT-III

Unconventional Machining Processes: Introduction, need and classification of unconventional machining processes. Principles, process parameters, set-up and applications of the following unconventional machining processes: electric discharge machining (EDM), electrochemical machining (ECM), ultrasonic machining (USM), abrasive jet machining (AJM), laser beam machining (LBM), electron beam machining (EBM) and plasma arc machining (PAM).

UNIT-IV

Surface Finish Measurement and Surface Improvement: Introduction, elements of surface texture, evaluation and representation of surface roughness, effect of surface finish on functional properties of parts. Measurement of surface roughness, surface cleaning and surface treatment, diffusion and ion implantation, Surface coating and deposition processes: surface plating, conversion coating, physical vapour deposition and chemical vapour deposition processes.

UNIT-V

Processing of Particulate Metals, Ceramics-Composites: Introduction, basic P/M processes, powder manufacture, testing and blending, compacting, sintering, hot pressing, other techniques to produce high-density powder metallurgy products, properties of P/M products, advantages and limitations of powder metallurgy; Processing of traditional ceramics, processing of new ceramics and cermets, types and properties of composites and shaping processes for polymer matrix composites.

Learning Outcomes:

Upon completing the course, student will be able to:

- Learn the effect of various parameters on the metal cutting process.
- Learn the mechanics of bulk metal forming processes and select the equipment and tooling needed for the various forming operations
- Understand the importance of surface finish of manufactured parts and learn about the various methods to improve it.
- Learn about the powder metallurgy processes and about the processing of ceramics and composites.

BOOKS RECOMMENDED:

- [1] Ghosh Amitabh & Mullick Ashok, *Manufacturing science*, East West Press Pvt.Ltd,2ed,2010.
- [2] Sharma P. C., *A Text Book of Production Engineering*, S. Chand Publishing,11ed,1982.
- [3] HMT(Hindustan Machine Tools), *Production Technology*, McGraw-Hill Education,2017
- [4] Mikell P Groover, *Fundamentals of Modern Manufacturing*, Wiley,6ed, 2015
- [5] Rao P.N., *Manufacturing Technology,Vol-1,Vol-2*, McGraw-Hill Education,2017.

LIST OF PRACTICAL ASSIGNMENT

- Measurement of various features of tool geometry of a given single point tool and the tool wear using a tool maker's microscope.
- Measurement of surface finish of machined components
- Measurement of a component features using a profile projector.
- To perform process planning and prepare operations sheet and tool layout for machining a workpart on a capstan/turret lathe.
- To machine a given workpart according to the prepared process plan and operations sheet.
- To study the constructional features of EDM machine.
- To machine a work part as per given drawing on EDM machine.
- To study of the constructional features of universal cylindrical grinder.
- To estimate the power requirements and the forces generated theoretically at the chip tool interface during turning, drilling and milling operations.
- To measure the forces generated at the chip tool interface during machining operations.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Mechanical Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6C3 FLUID MACHINES	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- To fundamentally understand the principle of fluid machines.
- To understand the working and operation different fluid machines.
- To model and simulate flow situations.
- To extend the theory to related machines.

Prerequisite(s): Fluid Mechanics, Applied Mechanics, Engineering Thermodynamics, Applied Mathematics

COURSE CONTENTS

UNIT-I

Fundamental Principles: Newton's Laws of Motion and Reynolds Transport Theorem;

Conservation of Momentum: Linear Momentum Equation, Angular Momentum Equation; Forces on stationary and moving vanes, Forces on closed conduits: Reducer and Expanders, Bends, Torque on Sprinklers

UNIT-II Modeling and Similitude: Dimensional Homogeneity, Dimensionless parameters, Methods to find Dimensionless numbers, Buckingham π Theorem applications, Similitude: Modeling Criteria; Modeling Laws; Distorted Models. Conservation of Mass and Momentum

UNIT-III Turbines: Hydraulic Turbines: Impulse and Reaction Turbines; Velocity triangles, Euler's Equation of Work Done, Efficiencies; Pelton, Francis, Kaplan, Propeller and Bulb turbine: Constructional details and Performance characteristics, Unit quantities, Specific Speed; Governing; Comparison with other Turbines: Steam Turbines, Gas Turbines, Jet Engines

UNIT-IV

Pumps: Rotodynamic Pumps: Centrifugal, Axial; Constructional details, Performance Characteristics, Losses and Efficiencies, Net Positive Suction Head, Specific speed, Pumps in series and parallel; Multistage and Specific purpose pumps Positive Displacement Pumps: Types; Reciprocating Pumps: Indicator Diagram, Acceleration Head, Friction head, Air-Vessels, Double Acting Pumps

UNIT-V Cavitations and Water Hammers: Cavitations: Definition and Genesis, Effects on pumps and turbines, Thoma-Cavitation Factor, Measurement of Cavitation: Apparatus, Cavitation test, Prevention; Water Hammer: Physical phenomenon, fundamental equation, arithmetic integration, Prevention; Surge tanks; types and Role

Learning Outcomes: Upon completing the course, student will be able to

- Apply well-established concepts of the theory of fluid machines.
- Select Proper fluid machines.
- Operate and develop insight in maintenance.
- Develop a base for Computational Fluid Dynamics (CFD).

BOOKS RECOMMENDED:

- [1] Douglas John F., *Fluid Mechanics*, Pearson Education, 2005.
- [2] Dixon S.L., *Fluid Mechanics and Thermodynamics of Turbomachinery*, Elsevier, 5e, 2002, London.
- [3] Modi and Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Rajsons Publication Pvt Ltd, N Delhi, 5e, 2000.
- [4] Lal Jagdish, *Hydraulic Machines*, Metropolitan Book Company, 1995.

LIST OF PRACTICAL ASSIGNMENT

- To determine the coefficient of impact of water jet on vanes
- Performance evaluation of Pelton wheel using Pelton Wheel test rig
- Performance evaluation of Kaplan Turbine using Kaplan Turbine test rig
- Performance evaluation of Centrifugal Pump using Centrifugal Pump test rig
- Performance evaluation of Reciprocating Pump using Reciprocating Pump test rig.

Devi Ahilya University, Indore, India				III Year B.E. Mechanical Engg			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6C4	L	T	P	L	T	P	Total
ENERGY CONVERSION SYSTEMS							
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- To make students to understand principal and operation of vapour power cycles.
- To develop the understanding of the combustion of fuel in boiler furnace.
- To make students to understand principal construction and working of different types of power boilers used in steam power plants
- To make them able to perform the testing to find boiler efficiency and heat balance sheet.
- To understand the operation and design of steam turbines, Nozzles, condensers and cooling towers.

Prerequisite(s): Engineering Thermodynamics, Thermal Engineering

COURSE CONTENTS

UNIT-I

Vapour Power Cycles: Simple Rankine Cycles, Binary Vapour Cycles, Regenerative Cycles, Reheating Cycles, Combined Reheating-Regenerative Cycle, Water Extraction Cycle, Back Pressure, Pass-out and Mixed Pressure Turbine Cycles.

Power Station Economics: Elements of fixed and operating costs, power and various tariffs, definitions and applications of load curves, load factor, Capacity factor, plant-utilization factor, diversity factor and demand factor.

UNIT-II

Steam Generators: Fuels and Combustion for Steam Generators. High-pressure steam boilers-Advantages of high pressure boilers, Lamont Boiler, Benson Boiler, Monotube Boiler, Loeffler Boiler, Velox Boiler, Revolving Boilers, Radiant Type boiler for power plants, Heat recovery steam generators(HRSG), Fluidised Bed Boiler, Super Critical Boilers, Draughts, Chimney calculations,

Performance of Boiler- Equivalent Evaporation, Boiler Trial , Boiler Efficiency, Heat balance sheet, Overview of Boiler Codes.

UNIT-III

Nozzles: Introduction, General flow analysis, Nozzle equation, , Types and Construction of Nozzles and Diffusers, Design Parameters, Theory of steam injectors, Flow through Nozzles and Diffusers, Nozzle Efficiency, Diffuser Efficiency, Critical Pressure Ratio, effect of friction on performance. Effect of Variation of Back Pressure

UNIT-IV

Steam Turbines: Steam Turbine types, Flow of Steam through Impulse Turbine Blades, Flow of Steam through Impulse-Reaction Turbine Blades, Energy Losses in Steam Turbines, State Point Locus, Reheat Factor, and Design procedure, Governing and Performance of Steam Turbines, Steam Turbine Auxiliary Systems, Construction, Stress Analysis, Operation and Maintenance of Steam Turbines.

UNIT-V Condensers and Cooling Towers: Functions of Condensers, Cooling Systems, Elements of Water Cooled Condensing unit, Types of Condensers- Jet Condensers, Surface Condensers, Condenser, Vacuum and Measurement, Dalton's law of partial pressure, Mass of circulating water required, Air leakage, its effects and removal, Air cooling system, Design of condensers, Air Pumps, Vacuum Efficiency, Condenser Efficiency, Cooling Ponds and Cooling Towers, Analysis of Cooling Tower (Cooling efficiency, Range, Approach)

Learning outcomes:

- Upon Completing the Course, Student will be able to:
- Determine the overall efficiency of steam power plant through various arrangements of vapour power cycles.
- Determine the thermo chemistry of fuels and Actual air and Coal required in Furnace of boilers
- Understand the working of actual power boilers used in steam power plants, its chimney calculation and to perform the boiler trial for efficiency and input / output of heat
- Understand the working of steam nozzles and diffusers and determine the performance parameters and efficiency of steam nozzles
- Determine the Diagram Power, Gross Stage Efficiency, Specific steam consumption and Design parameters of steam turbines.
- Understand the construction, operation and Maintenance of Steam Turbines and its auxiliaries.
- Determine the performance parameters of Condensers, air pumps, cooling Towers.

BOOKS RECOMMENDED:

- [1]. Skrotzki & Vopat, *Power Station Engg. & Economy*, Mc Graw & Kagakush, 1960.
- [2]. Dr. R. Yadav, *Applied Thermodynamics*, Central Publishing House, 2012.
- [3]. Dr. R. Yadav, *Steam & Gas Turbines and Power Plant Engineering*, 2015.
- [4]. Arora S.C. & Domkundwar S. *Power Plant Engineering* Dhanpat Rai Sons, 2005.
- [5] P.K. Nag, *Power Plant Engineering*, TMH, 2008.

LIST OF PRACTICAL ASSIGNMENTS

- To study the working of High Pressure Boilers.
- To Study the Induced Draught, Forced Draught and Balanced Draught.
- To find the boiler efficiency using Orsat's Apparatus.
- To study the Steam Nozzles and determine the Nozzle Efficiency.
- To study the Steam Turbines in any Thermal power plant.
- To study of Condensers and Cooling Towers and determine the Condenser Efficiencies.
- To study and determine the thermal efficiency of any thermal power plant in an Industrial Visit.
- To study and determine the thermal efficiency of cogeneration power plant in a Process Industry Visit.

Devi Ahilya University, Indore, India				III Year B.E. Mechanical Engg			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6G1	L	T	P	L	T	P	Total
MATERIALS MANAGEMENT							
Duration Of Theory Paper: 3	3	1	-	3	1	-	4

Learning Objectives:

1. To inbuilt the concepts of Material handling and purchase procedure of an organization.
2. To impart the basics of standardization & stores management within organization.
3. To concrete the concepts of inventory management for effective decision making related to material & inventory.

Prerequisite(s): Basic concepts of Industrial Engineering and Management, Principles of Management.

COURSE CONTENTS

UNIT-I

Introduction: Objective of materials management, field and scope of material management, general analysis material quality, material planning programming. Integrated approach to Materials Management, Standardization, simplification, codification.

UNIT-II

Purchase Management: Scientific purchasing; objectives, organization of purchasing functions, Purchase cycle, Method of Buying; buying under certainty, buying under uncertainty, Purchasing under different circumstances, inspection and testing, purchasing for mass production, purchase contract, make or buy decision, material import, DGS & D rate contract.

UNIT-III

Stores Management: Stores organization, functions of scientific stores management, types of stores, store layout, store security, stores receipts, methods of storing, record – keeping & checking, issue methods, stores layout.

UNIT-IV

Inventory Management: Selective control of inventory, various inventory models, quantity discounts, shortages, instantaneous production with back orders, fixed time mode, single period model of profit maximization with time independent costs, lead time , re-order point , buffer stock, models with price breaks, POQ system.

UNIT-V

Supply chain Management: Understanding the Supply chain, Process view of the supply chain,

Supply chain performance: achieving Strategic Fit, Supply chain Drivers and Obstacles.

Learning Outcomes:

Upon Completing the Course, Student will able:

1. To understand the basics of Material handling techniques used in industries.
2. To understand the basics of purchase procedure and its management.
3. To understand the basics of stores and inventory management techniques used in industries.
An overview of supply chain management.

BOOKS RECOMMENDED:

- [1]. Lee & Dobler, *Material management*. Tata Mc.Graw Hill, 1990, 5e
- [2]. Arnold J.R Tony & Stephen N. Chapman, *Introduction to Material management*. PHI, 2003, 7e
- [3]. Gopal Krishnan, *Material Management*, PHI 2015, 2e
- [4]. L.C.Jhamb, *Materials and Logistics Managemnt*, Everest Publication, 1e
- [5]. Sunil Chopara and Peter Meindl, *Supply chain Management*, Pearson Education, 6e

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Mechanical Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
SMR6S6 ENTREPRENEURSHIP DEVELOPMENT & IPR	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	2	-	-	2	-	-	2

Learning Objectives:

- To provide awareness about entrepreneurship.
- To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
- To self motivate the students by making aware of different opportunities and successful growth stories
- To impart the basics of Intellectual property Rights.

Prerequisite(s): Nil

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise-Definition and Classification (MSME- Micro, Small & Medium Enterprises). **Case Study:** Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model. **Class Activity:** Idea generation by students.

UNIT III Business Plan for Start-ups in IT Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs, DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks.

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1]. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2]. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications,
New Delhi, 2011.
- [3]. N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Mechanical Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6L4 WORKSHOP/PRACTICAL MACHINE DESIGN-II	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	-	-	2	-	-	1	1

Learning Objectives:

- To solve the Practical based problems forthe designing the Mechanical Components.
- To introduce the market survey practice to the students.
- To develop the practice for literature survey to the students.
- To prepare the students to work in a team.

Prerequisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

1. Problem on Design of Single Plate Clutch/Cone Clutch
2. Problem on Design of Centrifugal Clutch.
3. Problem on Design of Flat/V Belt.
4. Problem on Design of Screw Jack.
5. Problem on Design of Spur/Helical/Bevel Gears.
6. Problem on Design of parts subjected to Fatigue Loading.
7. Problem on Design of Shoe/Band/Block/Internal Expanding Brake.
8. Problem on Design of Engine Cylinder/Piston/Connecting rod.
9. Problem on Design of Crank Shaft.
10. Problem on Design of Valve and Valve gear mechanism.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Get the practical knowledge of designing the various components of Internal Combustion Engine.
- Learn the market survey practice.

- Get practice of literature survey.
- Learn to work in a team.

BOOKS RECOMMENDED:

- [1]. Shigley J.E., *Mechanical Engineering Design*, McGraw-Hill 2015.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2007.
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2013
- [4]. Bhandari V.B., *Design of Machine Elements*, McGraw-Hill, 4e, 2017.
- [5]. Black and Adams, *Machine Design*, Mc.Graw Hill, 1968.
- [6]. Maleev V.L., *I.C.Engine Design*, Mc.Graw Hill, 1945.

SEMESTER - VI B.E COMPUTER ENGINEERING

S.No	Subject Code	Subject Name	Type	L-T-P	Credits	
1	CER6C1	COMPUTER GRAPHICS	PC	3-1-0	4	
2	CER6C2	DESIGN AND ANALYSIS OF ALGORITHMS	PC	3-1-1	4+1(P)	
3	CER6C3	COMPILER TECHNIQUES	PC	3-1-1	4+1(P)	
4	CER6EX	---	PE	3-1-1	4+1(P)	
5	MER6G4	WIRELESS AND MOBILE NETWORKS	GE	3-1-0	4	
6	CER6L4	COMPUTER GRAPHICS LAB	-	0-0-1	1	
7	SCR6S6	PROFESSIONAL DEVELOPMENT	-	2-0-0	2	
8	CER6V6	COMPREHENSIVE VIVA-VI	VIRTUAL	0-0-4	4	
			TOTAL CREDIT			30
PROGRAMME ELECTIVE						
1	CER6E1	DATA WAREHOUSING AND MINING	PE	3-1-1	4+1(P)	
1	CER6E2	RECENT TRENDS IN COMPUTER ENGINEERING	PE	3-1-1	4+1(P)	
2	CER6E3	BIOINFORMATICS	PE	3-1-1	4+1(P)	
3	CER6E4	DIGITAL IMAGE PROCESSING	PE	3-1-1	4+1(P)	

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Computer Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
CER6C1 COMPUTER GRAPHICS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	-	3	1	4	4

Learning Objectives: The goal of this course is to provide an introduction to the theory and practice of computer Graphics.

Prerequisite(s): Programming language: C++/JAVA

COURSE OF CONTENTS

UNIT I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

UNIT II

Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; **Hard Copy devices:** Printers and Plotters; **Input devices:** Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

UNIT III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

UNIT IV

Three Dimensions: 3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, Bspline.

UNIT V

Shading and Color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

Learning outcomes:

- To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- To describe the importance of viewing and projections.
- To define the fundamentals of animation, virtual reality and its related technologies. 5. To understand a typical graphics pipeline 6. To design an application with the principles of virtual reality

BOOKS RECOMMENDED

- [1]. Hearn Donald and Baker M.Pauling, *Computer Graphics*, 2/e, Prentice Hall of India.
- [2]. Hearn Donald and Baker M.Pauling, *Computer Graphics with OpenGL*, 3/e, Prentice Hall, 2004.
- [3]. David F. Rogers, *Procedural Element of computer Graphics*, McGraw Hill International.
- [4]. William M. Newman Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw Hill.
- [5]. J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, *Introduction to ComputerGraphics*, Addison-Wesley, 1994.
- [6]. Zhigang Xiang and Roy Plastock, *Computer Graphics*, Tata McGraw Hill Publications.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Computer Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
CER6C2 DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	1	5

Learning Objectives:

- Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
- Knowledge of algorithm design strategies
- Familiarity with an assortment of important algorithms
- Ability to analyze time and space complexity

Prerequisite:

The students are required to have familiarity with the following data structures: Arrays and linked lists, Stacks and queues, Graphs and trees, binary search trees, height balancing, Heaps and priority queues

COURSE CONTENTS

UNIT-I

Introduction to Algorithms: Notion of algorithms, properties, important areas of research in connection with the study of algorithms, Types of algorithms; Analysis-best case, worst case, and average case. Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

UNIT-II

Selected Algorithms for Sorting, Searching and matrix multiplication: Elementary sorting techniques: Selection, Bubble, and Insertionsorts; Advanced sorting techniques: Heap, Merge and quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements. Divide-and-Conquer strategy, Strassen's matrix multiplication.

UNIT-III

Greedy Method and Dynamic Programming: Algorithms design techniques based on Greedy Method and Dynamic programming. Illustration of these strategies using appropriate examples including Knapsack problem, optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, and Matrix chain multiplication problem.

UNIT-IV

Backtracking, Branch-and- Bound, and String Matching: Backtracking and Branch-and- Bound algorithm design techniques, Illustration of these techniques using appropriate examples like Queens Problem, subset sum problem, traveling salesperson problem, etc. Introduction to string matching problem, Applications, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc.

UNIT-V

The Theory of NP-Completeness: Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Decision and optimization problems, Tractable and Intractable Problems, Computational Classes: – P, NP, NP-Complete, and NP-Hard; reducibility, Selected NP-Complete and NP-Hard problems: Hamiltonian cycle, Traveling Salesperson (TSP). Satisfiability, Clique problems, etc.

Learning Outcomes:

Students who have completed this course should be able to:

- Apply design principles and concepts to algorithm design
- Have the mathematical foundation in analysis of algorithms
- Understand different algorithmic design strategies
- Analyze the efficiency of algorithms using time and space complexity theory

Assessment methods of all of the above: quizzes, exams, assignments, practicals

BOOKS RECOMMENDED:

- [1] Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, *Introduction to Algorithms*, Second Edition, MIT Press/McGraw-Hill, 2001.
- [2] Michael T Goodrich and Roberto Tamassia, *Algorithm Design: Foundations, Analysis, and Internet Examples*, Second Edition, Wiley, 2006.
- [3] Jon Kleinberg and Éva Tardos, *Algorithm Design*, Pearson, 2005.
- [4] E. Horowitz, S. Sahni, S Rajasekaran, *Computer Algorithms*, Galgotia Publications.

- [5] Saara Base, *Computer Algorithms: Introduction to Design and Analysis*, Addison Wesley, 2/e, 1988.
- [6] Knuth, D, *The art of computer programming*, Vols. 1-2-3, Addison Wesley 1968-73.
- [7] A V Aho, J E Hopcroft & J D Ullman, *The Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.
- [8] Vijay V Vazirani, *Approximation Algorithms*, Springer-Verlag, 2001

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Computer Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
CER6C3 COMPLIER TECHNIQUES	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- Provide a framework for understanding the fundamentals of Compiler. To familiarize students with new Compilation Problems.
- Develop skills to understand how to Design a Compiler.
- Develop ability to understand how to enhance performance of a Compiler for newly evolved Programming Languages.

Prerequisites: Knowledge of Computer Programming, Data Structures, Discrete Mathematics. Knowledge of several different Programming Languages will be useful.

COURSE CONTENTS

UNIT I

Introduction to Compiling: Compilers: The Analysis-Synthesis Model of Compilation, The Context of a Compiler; Analysis of the Source Program: Lexical Analysis, Syntax Analysis, Semantic Analysis; The Phases of a Compiler: Symbol-Table Management, Error Detection and Reporting, The Analysis Phases, Intermediate Code Generation, Code Optimization, Code Generation; Cousins of the Compiler: System Software, Interpreters, Kinds of Language Processors, Preprocessors, Assemblers, Linkers and Loaders, Macros; The Grouping of Phases: Front and Back Ends, Passes, Reducing the Number of Passes; Compiler Construction Tools.

UNIT II

Lexical Analysis: The Role of the Lexical Analyzer: Lexical Analysis Versus Parsing, Tokens, Patterns and Lexemes, Attributes for Tokens, Lexical Errors; Specification of Tokens: Strings and Languages, Operations on Languages, Regular Expressions, Regular Definitions; Recognition of Tokens: Transition Diagrams.

UNIT III

Syntax Analysis: Introduction: The Role of the Parser, Classification of Grammars, Syntax Error Handling; Context-Free Grammars: Parse Tree and Derivations, Ambiguity, CFG Versus Regular Expressions; Writing a Grammar: Lexical Versus Syntactic Analysis, Eliminating Ambiguity, Elimination of Left Recursion, Left Factoring; Top- Down Parsing: Recursive Descent Parsing, LL(1) Grammars, Nonrecursive Predictive Parsing; Bottom-Up Parsing: Reductions, Shift Reduce Parsing, Conflicts During Shift Reduce Parsing; LR Parsing: Simple LR, Constructing SLR-Parsing Tables, Constructing LALR Parsing Tables; Using Ambiguous Grammars: Precedence and Associativity to Resolve Conflicts, The “Dangling-Else” Ambiguity.

UNIT IV

Intermediate-Code Generation and Run-Time Environment: Variants of Syntax Trees: Directed Acyclic Graphs for Expressions, The Value-Number Method for Constructing DAG’s; Three Address Code: Addresses and Instructions, Quadruples, Triples; Type Checking: Rules for Type Checking, Type Conversions; Storage Organization: Static Versus Dynamic Storage Allocation; Stack Allocation of Space: Activation Trees, Activation Records; Introduction to Garbage Collection: Design Goals for Garbage Collectors, Reachability.

UNIT V

Code Optimization and Planning a Compiler: Basic Blocks and Flow Graphs: Basic Blocks, Flow Graphs, Representation of Flow Graphs; Optimization of Basic Blocks: The DAG Representation of Basic Blocks, Local Common Subexpressions Elimination, Semantic Preserving Transformations, Global Common Subexpressions Eliminations, Dead Code Elimination; Loop Optimization: Loop Invariant Code Motion, Reduction in Strength, Induction Variable Elimination, Loop Unrolling; Planning a Compiler: Source Language Issues, Target Language Issues, Performance Criteria.

Learning Outcomes:

Upon completing the course, students will be able to:

- Acquire advance knowledge and understanding of Compiler Use skills in Compiler Design.
- Apply acquired knowledge to improve performance of a Compiler.
- In addition to development in technology computer architectures offers a variety of resources of which students will be able to innovate in the Compiler Design.

BOOKS RECOMMENDED:

[1]. Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.

[2]. Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.

[3]. System Programming: D M Dhamdhare; McGraw Hill Education.

[4]. System Programming and Operating Systems: D M Dhamdhare; McGraw Hill Education.

Devi Ahilya University, Indore, India				III Year B.E. Computer Engg			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
CER6E1	L	T	P	L	T	P	Total
DATA WAREHOUSING AND MINING							
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- Ability to understand the role of data mining in knowledge discovery process.
- To familiarize with various data mining functionalities and how it can be applied to various real-world problems.
- To learn about finding data characteristics and evaluating the outcome of data mining process.
- To familiarize with various machine learning algorithms used in data mining.

Prerequisite(s):

The students are required to have some basic knowledge about Data structures and Databases.

COURSE CONTENTS

UNIT I

Introduction: Data Mining: Overview, Type of data mined, Functionalities, Technology used, Target applications and challenges; Data Features: Attribute types, basic statistical description, measuring data similarity and dissimilarity.

UNIT II

Data Preprocessing and Data Warehouse: Data Preprocessing: Overview, Data cleaning, Data integration, Data reduction, Data transformation and discretization; Data Warehouse: Basic concepts, Design and Usage, Implementation.

UNIT III

Frequent Pattern and Association rule Mining: Basic concepts, Pattern Mining: Apriori algorithm, FP-growth Algorithm; Generating association rules, Pattern evaluation methods, Multi-level and multi-dimensional pattern mining.

UNIT IV

Classification: Introduction, Decision tree induction, Bayes classification, Rule based classification, Advance classification methods: Bayesian belief networks, backpropagation etc.

UNIT V

Cluster analysis and Advance Topics: Clustering: Introduction, Types of clustering; Partition-based clustering: K-Means, K-Medoids; Density based clustering: DBSCAN, Clustering evaluation.

Web Data Mining: Introduction, Types of Web mining, and Overview of web usage mining, web content mining and web structure mining.

Learning Outcomes:

Students who have completed this course should be able to:

- Apply data mining functionalities on real world problems and datasets.
- Have some knowledge about the couple of data mining tools and how they can be used for large data.
- They would be able to find the characteristics of given data and may identify presence of outliers, if any.
- The course would help them to pursue some advance course on data science and may help in subjects like Big Data, AI etc.

Assessment methods of all of the above: quizzes, exams, assignments, practicals

BOOKS RECOMMENDED:

- [1] Han, Kamber and Pi, Data Mining Concepts & Techniques, Morgan Kaufmann, 3rd Edition, India, 2012.
- [2] Mohammed Zaki and Wagner Meira Jr., Data Mining and Analysis: Fundamental Concepts and Algorithms, Cambridge University Press, 2014.
- [3] Z. Markov, Daniel T. Larose Data Mining the Web, Jhon wiley & son, USA, 2007.
- [4] Bing Liu, Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, Springer, 2nd Edition, 2011.
- [5] Sam Anahory and Dennis Murray, Data Warehousing in the Real World, Pearson Education Asia, 2000.
- [6] W. H. Inmon, Building the Data Warehouse, 4th Ed Wiley India, 2005.

List of Experiments :

R-programming and WEKA tools need to be learn in order to complete the lab assignments.

- To know your data, an experiment to visualize summarized data using box-plot, scatter plot and quantile-quantile plot using R-Programming.
- To clean your data, an experiment to find outliers, remove noise and identify correlated data using R-Programming.
- To implement A-priori algorithm to find the frequent patterns in the given dataset. Students can use programming language of their choice to code.
- Use of WEKA tool to use various association mining algorithms on datasets and evaluate them based on pattern evaluation measures.
- Use of WEKA tool to use various classification algorithms on datasets and evaluate them on the basis of accuracy and other parameters.
- Use of WEKA tool to use various clustering algorithms on datasets and evaluate them based on cluster quality and other parameters.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Computer Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
CER6G4 WIRELESS AND MOBILE NETWORKS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	-	3	1	-	4

Learning Objectives: To understand the basic concepts of wireless communication with focus on mobile networking.

- To provide knowledge of different techniques of wireless communication.
- To learn about integration of services and applications from fixed networks into mobile networks.

Prerequisite: Basic knowledge of Computer Networks.

COURSE CONTENTS

UNIT I

Introduction: Wireless Networks, Wireless vs Wired Networks, mobile devices, mobile applications, mobile environments and limitations, Wireless transmission-frequencies and regulation, multipath propagation, channel fading, Multiplexing and Modulation techniques, Spread spectrum-DSSS & FHSS,

UNIT II

Medium Access Control – motivation for specialized MAC, Hidden/Exposed, Near/Far terminal effect, MAC protocols – SDMA, FDMA, TDMA, Reservation Aloha, PRMA, MACA, DSMA etc.

Cellular networks- overview, Cellular Concept and Frequency Reuse, Channel Allocation, Call Setup, Cell Handoffs, Location Management, CDMA, GSM- Architecture, GSM-Air Interface, protocols, HLR/VLR, localization & calling, security, GPRS.

UNIT III

Wireless LAN : Infra vs Radio transmission, infrastructure vs ad hoc network, IEEE 802.11-system and protocol architecture, MAC management, IEEE 802.11 flavours, Bluetooth – architecture, radio and basband layer, L2CAP, IEEE 802.15, WiMax and Zigbee overview

UNIT IV

Mobile Network Layer : Entities, Packet delivery, Agent Discovery, Tunneling and encapsulation, optimization, reverse tunnelling, **Mobile Transport Layer :** Congestion control and implication of mobility, slow start, Mobile TCP – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ Fast recovery. **Support for Mobility** – File System – CODA, WAP – Architecture,

UNIT V

Mobile Adhoc Networks- Protocols and Routing,

Advances in Mobile Technologies- 5G and Beyond, Internet of Things (IoT), Internet of Every Thing (IoE), Wireless Sensor Networks, Mobile Opportunistic Networks

Wireless Network Planning and Administration- Wireless Hardware, Wireless Network Design and Deploy, Troubleshooting hardware and connection issues.

Learning Outcomes:

Upon completing the course, students will:

- Be familiar with wireless communication methodologies
- Learn wireless communication protocols and different standards
- Be able to apply these concepts in Wireless Network planning, design and administration to support mobility.

BOOKS RECOMMENDED:

[1]. Jochen Schiller, Mobile Communications, Pearson Education, 2/e, 2003.

[2]. W. Stalling, Wireless Communications & Networks, Pearson Education, 2/e, 2005.

[3]. Dharma P. Agrawal and Qing-An Zeng, Introduction to Wireless and Mobile Systems, Cengage Publication, 2012.

[4]. Wale Soyinka, Wireless Network Administration-A Beginner's Guide, Tata McGraw-Hill Edu, 2010.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Computer Engg (Full Time)				
Subject Code & Name		Instruction Hours Per Week			Credits			
CER6L4 COMPUTER GRAPHICS LAB		L	T	P	L	T	P	Total
Duration Of Theory Paper: 1		0	0	2	0	0	1	4

List of Practical Assignments :

1. Implement following line drawing algorithm & compare it on the basis (mentioned in table given below) and prepare the table.

	Bresenham	DDA
No. of addition or subtraction		
No. of multiplication		
Execution time		

2. Implement following Circle drawing algorithm & compare it on the basis (mentioned in table given below) and prepare the table.

	Bresenham	Mid point algorithm
No. of addition or subtraction		
No. of multiplication		
Execution time		

3. Implement following Character generation algorithm & compare it on the basis (mentioned in table given below) and prepare the table.

	Stroke	Bit Map
Execution time		
Implementation complexity (advantages/disadvantages)		

4. Implement following Polygon filling algorithm & compare it on the basis

	Seed fill	Scan line
Execution time		

(mentioned in table given below) and prepare the table.

Implement Cohen Sutherland and Cyrus Back line clipping algorithms and display the clipped portion of line as demonstration.

5. Implement Cohen Hoghman polygon clipping algorithm to clip a polygon against a rectangular boundary and combine Cohen Hoghman polygon clipping algorithm with Cyrus Back line clipping algorithms to clip a polygon against another polygon and display the clipped portion of polygon.

6. Implement the following 2D transformation using matrix multiplication.

Translation

Rotation

Scaling

Shearing

Reflection

7. Implement parallel (oblique and axonometric) and perspective projection and display following objects using projections.

Pyramid

Rectangles

8. Implement the following 3D transformation using matrix multiplication. And display using perspective projection.

Translation

Rotation

Scaling

Shearing

Reflection

9. Implement rotation of an object about any arbitrary axis.

10. Implement reflection of an object about any arbitrary plane.

11. Implement the L-system for generation of symmetric objects(Fractals)

12. Generate 2D curve and surfaces using implementation of Bezier curve.

13. Implement the following visible surface detection algorithm and compare them on the basis of complexities and execution time.

Z-buffer

Scan-line

Depth sorting

Octree

RayCasting

14. Implement the following rendering algorithm and compare them on the basis of complexities and execution time.

Flat Shading

Gouraud shading

Phong shading

Ray tracing

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Computer Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
SCR6S6 PROFESSIONAL DEVELOPEMENT	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	2	1	0	2

LEARNING OBJECTIVES:

Students who successfully complete this course will:

- Become aware of local business practices world wide
- Understand and evaluate the issues that impact their learning communities
- Gain new perspectives on their aspired professional areas
- Become aware of culturally-specific business practices, perspectives on work ethic, constructive interactions, and related issues
- Become aware about the job Market and their growth

PRE REQUISITES: Basic Knowledge about organization, business environment & computer, Internet or smart phone (for social networking sites).

COURSE CONTENTS

UNIT I

Time Management: Time Management perception, Time Management & your life, Set Priorities, Magic of 168, S.M.A.R.T., Time Management Tools, Time Management Behavior

UNIT II

Strengthen different Skills - I: critical thinking skills, creative problem-solving skills, critical reflection skills, Make cognitive connections between learning & other learning experiences, Strengthen collaborative learning and teamwork skills

UNIT III

Strengthen different Skills- II: Strengthen academic writing skills, Strengthen oral presentation skills, Strengthen critical reflection skills, Become familiar with resources available for further research on business practices and issues, as well as culturally-specific business behavior

UNIT IV

Personality: Defining Personality, Personality Determinants, Personality Development, Personality Change, Various types of Personality, Motivation and its Process, Increase intercultural skills through guided consideration of varied perspectives

UNIT V

Communication Skills: Strengthen academic writing skills Resume Writing, Strengthen oral presentation skills Interview , Discuss speech and short memo assignments, Strengthen critical reflection skills GD, Listening skills

Unit VI

Leadership: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership, Theories Of Leadership, Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory, Transformational Leadership Theory, Charismatic Theory.

CASE STUDIES

Industry Visit and Training after completion of the course by students with the help of placement cell.

Using social networking sites students have to develop their professional network.

LEARNING OUTCOMES:

The Professional Development course is comprised of two essential elements: a methodological and contextual seminar and a practical industry survey. The methodological and contextual seminar is delivered by faculty that includes readings, lectures, and discussion of local business practices, key issues for organizations associated with the learning communities.

It also includes discussion of the students' areas of professional interests, and culturally-specific training for students' constructive interaction with local industry. Students will visit local organizations as a group and will gain first-hand knowledge of operations and issues. Discussion with industry leaders will complement these visits. Preparatory group discussions prior to field visits and reflective group exercises following visits will enable students to compare and contrast their observations, challenge and confirm their prior thinking, and sharpen their understanding of the issues that impact their learning communities.

SEMESTER - VI B.E ELECTRONICS & INSTRUMENTATION ENGINEERING

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	EIR6C1	VLSI DESIGN	PC	3-1-0	4
2	EIR6C2	MEDICAL AND ANALYTICAL INSTRUMENTATION	PC	3-1-1	4+1(P)
3	EIR6C3	CONTROL SYSTEM	PC	3-1-1	4+1(P)
4	EIR6EX	--	PE	3-1-1	4+1(P)
5	SER6S6	ENTERPRENEURSHIP AND IPR DEVELOPEMENT	OS	2-0-0	2
6	EIR6G4	COMPUTER NETWORKS	GE	3-1-0	4
7	EIR6L4	DESGIN WORKSHOP	-	0-0-1	1(P)
8	EIR6V6	COMPRHENSIVE VIVA- VI	VIRTUAL	0-0-4	4
				TOTAL CREDIT	30
PROGRAMME ELECTIVE					
1	EIR6E1	LINEAR INTEGRATED CIRCUITS	PE	3-1-1	4+1(P)
2	EIR6E2	MULTIMEDIA COMMUNICATION	PE	3-1-1	4+1(P)
3	EIR6E3	MOBILE AND WIRELESS COMMUNICATION	PE	3-1-1	4+1(P)
4	EIR6E4	MODELING AND SIMULATION	PE	3-1-1	4+1(P)
5	EIR6E5	TELECOM AND SWITCHING NETWORK	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Instrumentation Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
EIR6C1 VLSI DESIGN	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Course Objective: This course presents the fundamental of Digital CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite: Knowledge of Digital Circuit and Basics of Semiconductors is required.

COURSE CONTENTS

UNIT I

VLSI design flow, VLSI design style, introduction to the basic fabrication processes (wafer preparation, oxidation, diffusion, etching, metallization and lithography, etc.), Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor.

UNIT II

Threshold voltage equation and energy band diagram of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances. Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter

UNIT III

Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation. Limitations of CMOS in NANO scale circuit design.

UNIT IV

CMOS logic, Complex Logic Circuits, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit using CMOS and analysis of various design parameters.

UNIT V

Sequential MOS Logic circuits , SR Latched circuits, clocked latch and Flip Flop Circuits, CMOS D latch and Edge Triggered Flip Flop, Design of the Schmitt trigger circuit, Dynamic random access and Static random access memory cell design and analysis, Sense amplifier and row and column decoder circuit.

Learning outcomes:

- Design building blocks of digital IC using Gate level Modeling.
- Design building blocks of digital IC using Dataflow Modeling.
- Design stimulus blocks to test the functionality of the designs.

BOOKS RECOMMENDED:

- [1]. Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, Tata McGraw-Hill, 3/e.
- [2]. R. Jacob Baker, Harry W. Li and David E. Boyce, *CMOS Circuit design, layout and Simulation*, PHI,IEEE press, Series Edition,
- [3]. Yuan Taur and Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Cambridge university Press, Special Edition, 1998
- [4]. Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, PHI, 2/e
- [5]. Jan M. Rabaey, *Digital Integrated Circuit*, PHI, 2/e

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronis & Instrumentation Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
EIR6C2 MEDICAL AND ANALYTICAL INSTRUMENTATION	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives: To understand the linkage between Medical Science & Engineering.

Prerequisites: Knowledge of Basic Electronics and Fundamentals of biology & chemistry.

COURSE CONTENTS

UNIT I

Sources of biomedical signals, Medical instrumentation system, General constraints in design of medical instrumentation system, Patient safety, Electric shock hazards, Effects of electric current on human body, Precautions to minimize electric shock hazards, Leakage current & its types, Testing of biomedical equipment.

UNIT II

Origin & types of bioelectric signals, Electrodes used for ECG, EEG, EMG, Electrical conductivity of electrode jellies & cream, Microelectrodes, Biomedical recorders: ECG, EEG, EMG, PCG, VCG, Lasers used in medical field, Bedside patient monitoring system, Biomedical telemetry & Telemedicine.

UNIT III

X-ray machine & Digital radiography, Principles & system components of Computed-Tomography, Magnetic Resonance Imaging: Principles of NMR, its Components & Biological effects, Ultrasonic & Thermal imaging systems.

UNIT IV

Cardiac pacemaker like External, Implantable pacemaker, Artificial kidney, Dialyzers, Haemodialysis machine, Stone disease problem, Lithotripter system, Principle of surgical diathermy, Surgical diathermy machine, Electro-surgery techniques, Electrodes used with surgical diathermy, Introduction to Defibrillators, Mechanics of Respiration, Artificial ventilation, Types of ventilators.

UNIT V

Fundamentals of analytical instruments, Electromagnetic radiation and its interaction with matter, Laws of spectroscopy, Various components of Absorption instruments, Ultraviolet & Visible absorption spectroscopy, Different types of Photometers and Spectrophotometers, Infrared & FTIR spectroscopy, Nuclear magnetic resonance spectroscopy: Principal & its types, Introduction to chromatography: Gas & Liquid, Computer-based analytical instruments.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the various sources of bioelectric signals & their processing.
- Describe the fundamentals of various recording & diagnostic instruments.
- Acquire & develop skills for preventive maintenance and repairing of medical instruments.
- Study & understand the fundamentals of medical & analytical laboratory instrumentation.

BOOKS RECOMMENDED:

- [1]. R.S.Khandpur, *Handbook of Biomedical Instrumentation*, 2/e, Tata McGraw-Hill, 2007
- [2]. John G. Webster, *Medical Instrumentation*, 4/e, Wiley, 2015
- [3]. Carr Brown, *Introduction to Biomedical Equipment Technology*, 4/e, Pearson, 2007
- [4]. R.S.Khandpur, *Handbook of Analytical Instruments*, 2/e, Tata McGraw-Hill, 2012
- [5]. H.H Willard, *Instrumental Methods of Analysis*, 7/e, Publisher Name, 1988

List of Practical Assignments:

- Study of ECG Simulator for understanding the ECG signal & its generation process.
- Using ECG Amplifier & CRO measure the amplitude, frequency & nature of ECG signal.
- Study of EEG Simulator for understanding the EEG signal & its generation process.
- Using EEG Amplifier & CRO measure the amplitude, frequency & nature of EEG signal.
- Study of EMG Simulator for understanding the EMG signal & its generation process.
- Using EMG Amplifier & CRO measure the amplitude, frequency & nature of EMG signal.
- Study of Heart & Pacemaker.
- Study of Defibrillator system.
- Study of Respiratory system.
- Experimental study of ph meter & UV-Spectrophotometer.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology			III Year B.E. Electronis & Instrumentation Engg (Full Time)				
Subject Code & Name	Instruction Hours Per Week			Credits			
EIR6C3 CONTROL SYSTEM	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	2	5

Learning Objectives:

- To provide the fundamental knowledge of control system engineering and the concept of mathematical modelling of the physical system.
- The subject gives various classical analysis tools for design and stability of system in time and frequency domain.

Prerequisites: Knowledge of Laplace transforms, Z-transform, Basics of MATLAB & Simulink.

COURSE CONTENTS

UNIT I

Introduction to the control system & Physical modeling: Basic component of control system (CS), open-loop CS (non-feedback system), close-loop CS (feedback CS), Types of feedback CS- linear and non-linear CS, time-invariant and time variant CS, single variable and multivariable control system. Effect of feedback on-overall gain, stability, sensitivity, external disturbance or noise, Block diagram representation of CS, Block diagram reduction rules, Transfer function (TF), Poles-zero concept, Signal flow graph (SFG), Mason's gain formula. Modeling of CS- electrical networks, mechanical systems- translational and rotational mechanical system, analogy concept- force to voltage (F-V) and force to current (F-I) analogy.

UNIT II

Time domain analysis & Stability: Time response of continuous-data system, Standard test signals, Time response of prototype first and second order CS, Performance specifications of prototype I & II order systems, Steady-state errors and error constants (positional, velocity, acceleration), Effect of adding Poles and Zeroes to open-loop and close-loop transfer function (TF), Concept of Dominant

poles of TF. Types of controllers and their control action-proportional (P), integral (I), derivative (D), PID control, and derivative feedback control, MATLAB based problems.

Stability-Concept of stability, Necessary conditions for stability, Absolute and relative stability, Algebraic Criterion of stability- Routh Hurwitz Criterion. The Root locus concept, Guidelines for sketching Root-locus, Root contour.

UNIT III

Stability and Frequency domain analysis of CS: Frequency domain analysis- Concept of complex frequency, performance specification of frequency domain, Co-relation between time & frequency domain, Polar plot, Bode plot, Stability analysis in frequency domain- Nyquist Criterion, Stability margins-Gain and Phase margin, MATLAB Based Problems.

UNIT IV

Design of Feedback CS & State Space Analysis of CS: Approach to system design, Preliminary considerations classical design, Realization of basic Compensators-Lead, Lag, and Lag-lead compensator, Design of compensators in Time and Frequency domain. Concept of State, State Variable, and State Model, State model representation of an LTI system, co-relation between State Model and TF, Solution of State Equations, Transfer Matrix, Concept of Controllability & Observability, MATLAB based problems.

UNIT V

Digital Control Systems: Block diagram representation of Digital Control System, Sampling process, Mathematical analysis of sampling process, Reconstruction of sampled signal, Pulse Transfer Function, Zero-order and first order hold circuit, Mapping of s-plane to z-plane.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the concept of LTI control systems, Importance of feedback in CS and stability concept.
- Able to Design a Stable Control System
- Understand the difference between Linear and Digital Control Systems.

BOOKS RECOMMENDED:

- [1] B.C. Kuo, *Automatic Control System*, 7/E, PHI, 2006.
- [2] I. J. Nagrath and M. Gopal, *Control Systems Engineering*, 5/E, New Age International Publishers, 2007.
- [3] M. Gopal, *Control Systems (Principles & Design)*, 5/E, Tata McGraw Hill, 2007.
- [4] Bishop & Dorf, *Modern Control System*, Addison Welseley.
- [5] Ogata, *Discrete-Time Control System*, 2/e, PHI, 1995.

List of Practical Assignments:

- Find the transfer function of various LTI control systems (open loop and close loop) using MATLAB command.
- Write a program to plot the poles and zeroes for the different sets of transfer function using MATLAB.
- Write a program to plot the time response of first and second order control system on impulse, unit-step, ramp and parabolic input signals using MATLAB. Also find the value of various transient response parameters.
- To determine the position, velocity and acceleration error coefficient of given transfer functions using MATLAB.
- Plot the root locus for various transfer functions using MATLAB command.
- Plot the Nyquist plot for the given transfer function using MATLAB. Also comment on the systems stability.
- Plot the Bode plot for the transfer function given below by using MATLAB.

$$G(s)H(s) = \frac{2(s+0.25)}{s^2 (s+1) (s+0.5)}$$

Also find (a) Phase cross over frequency (b) Gain cross over frequency (c) Gain margin (d) Phase margin.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronis & Instrumentation Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
EIR6E1 LINEAR INTEGRATED CIRCUITS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:In-depth knowledge of Operational Amplifier including its circuit analysis, design and application.

Prerequisites: Analysis using R-parameter and feedback concept.

COURSE CONTENTS

UNIT I

Operational Amplifier Fundamentals: Amplifier Fundamentals, The Operational Amplifier ,Basic Op Amp Configurations, Ideal and practical Op Amp Circuit Analysis and characteristics ,Positive and Negative Feedback , Feedback in Op Amp Circuits , The Return Ratio and Blackman's Formula , Op Amp Powering. Circuits with Resistive Feedback: Current-to-Voltage Converters, Voltage-to-Current Converters, Current Amplifiers, Difference Amplifiers, Instrumentation Amplifiers, Instrumentation Applications, Transducer Bridge Amplifiers. CMRR, offset error voltage and current.

UNIT II

Active filters I: The Transfer Function, First-Order Active Filters, Standard Second-Order Responses, *KRC* Filters, Multiple-Feedback Filters, State-Variable and Biquad Filters, Sensitivity. Active filters II: Filter Approximations, Cascade Design, Generalized Impedance Converters, Direct Design, The Switched Capacitor, Switched-Capacitor Filters, and Universal SC Filters

UNIT III

Static Op Amp Limitation: Simplified Op Amp Circuit Diagrams, Input Bias and Offset Currents, Low-Input-Bias-Current Op Amps, Input Offset Voltage, Low-Input-Offset-Voltage Op Amps, Input Offset Error and Compensation Techniques, Input Voltage Range/Output Voltage Swing, Maximum Ratings.

Dynamic Op Amp limitation: Open-Loop Frequency Response, Closed-Loop Frequency Response, Input and Output Impedances, Transient Response, Effect of Finite GBP on Integrator Circuits, Effect of Finite GBP on Filters, Current-Feedback Amplifiers.

UNIT IV

Stability: The Stability Problem, Phase and Gain Margin Measurements, Frequency Compensation of Op Amps, Op Amps Circuits with a Feedback Pole, Input-Lag and Feedback-Lead Compensation, Stability in CFA Circuits.

UNIT V

Designing- Adder, Subtractor, Integrator, Differentiator, Voltage follower, Comparator, Zero Crossing detector, Schmitt trigger, Peak Detector. Signal Generator: Sin wave generator, multivibrators, triangular and saw tooth wave generator, Log/Antilog amplifiers.

BOOKS RECOMMENDED:

- [1]. Millman & Halkias - Integrated Electronics, Tata McGraw Hill.
- [2]. Franco-Design with Operational Amplifiers & Analog Integrated Circuits, TMH
- [3]. Schilling & Belove-Electronic Circuit, Discrete & Integrated , TMH
- [4]. Gayakwad R.A- Op-Amps and Linear IC's, Pearson .
- [5]. Coughlin and Driscoll – Operational Amplifier and Linear Integrated Circuits – Pearson Education Asia.

List of Practical Assignments:

- To measure the gain of inverting & non-inverting amplifier.
- To analyze the voltage transfer characteristics of op-amp.
- To study the inverting adder & Subtractor configuration of op-amp.
- To study the non- inverting adder & Subtractor configuration of op-amp.
- To study the differentiator configuration of op-amp.
- To study the integrator configuration of op-amp.
- To study the low pass & high pass filter.
- To study the band pass & band reject filter.
- To study the zero crossing detector.
- To analyze the performance of comparator.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronis & Instrumentation Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
SER6S6 ENTERPRENUERSHIP AND DEVELOPEMENT IPR	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	2	-	-	2	-	-	2

Learning Objectives:

- To provide awareness about entrepreneurship.
- To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
- To self motivate the students by making aware of different opportunities and successful growth stories
- To impart the basics of Intellectual property Rights.

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise-Definition and Classification (MSME- Micro, Small & Medium Enterprises). **Case Study:** Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model. **Class Activity:** Idea generation by students.

UNIT III

Business Plan for New Ventures in Respective Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1]. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2]. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications, New Delhi, 2011.
- [3]. N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronis & Instrumentation Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
EIR6G4 COMPUTER NETWORKS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Learning Objectives: The content covers the different types of computer networks, the layered approach of protocol stack, its advantage, and protocols of each layer.

Prerequisite(s): Fundamental knowledge of data transmission

COURSE OF CONTENTS

Unit I

Computer network – Hardware, Software, Reference model, physical layer: Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast ,broadcast ,Network Topology – Mesh , Star ,Tree , Bus , Ring , Hybrid Physical Layer – Shannon’s maximum data rate of a channel, Transmission media – Guided as Magnetic, Twisted Pair, coaxial cable, fiber optics etc., wireless as radio wave, microwave, infrared

Unit II

Data Link Layer: Framing techniques , Error detection-correction , Multiplexing-TDM ,FDM,WDM ; switching – circuit , message , packet switching , Repeaters, Hubs , Bridges ,switches ,routers and gateways ;Data link protocols-- unrestricted simplex protocol, stop & wait , sliding window ,Go-back-n ,selective repeat, data link layer in internet

Unit III

Medium Access control sublayer: Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol Ethernet- frame format, cabling, encoding, performance, fast Ethernet, gigabit Ethernet, Broadband and wireless LAN, Bluetooth

Unit IV

Network layer: Connectionless – connection oriented service, comparison of virtual circuit and datagram subnet, Routing algorithms- shortest path , flooding ,distance vector , hierarchical routing , congestion control and prevention ,Quality of service , network layer in internet- IP protocol and IP address, IPv6, OSPF, BGP routing protocol

Unit V

Transport layer and Application layer: Elements of transport protocol, internet transport protocol- UDP / TCP protocol, performance issues-Network performance measurement, system design for better performance Domain name system, email, world wide web- architecture, HTTP

Learning Outcome:

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

BOOKS RECOMMEDED:

[1]. Andrew S. Tannenbaum, Computer Networks, 4/E Pearson Education, 2003 ,

[2]. William Stallings ,Data and Computer Communications , 8/E Prentice Hall India, 2007

[3]. Behrouz A.Forouzan , Data Communications and Networking ,4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute Of Engineering & Technology			III Year B.E. Electronis & Instrumentation Engg (Full Time)				
Subject Code & Name	Instruction Hours Per Week			Credits			
EIR6L4 DESIGN WORKSHOP	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	0	0	1	0	0	1	1

DESIGN (Digital & Analog circuit)

- Design a 3 bit counter which counts in the sequence
001, 011, 010, 110, 111, 101, 001, ...

(a) Use clocked D flip-flops
(b) Use J-K flip-flop
- Design and Implement a 8-bit barrel shifter using 4 X 1 Multiplexers.
- Design a one-input, one-output serial 2's complementer. The circuit accepts a string of bits from the input and generates the 2's complement at the output. The circuit can be reset asynchronously to start and end the operation.
- Design a four- bit shift register with parallel load using D flip- flops. There are two control inputs: shift and load. When shift = 1, the content of the register is shifted by one position. New data are transferred into the register when load = 1 and shift= 0. If both

control inputs are equal to 0, the content of the register does not change.
- Design a 16-bit Magnitude comparator using IC 7485 (4-bit Magnitude comparator).
- Design a hardware stack to hold a maximum of four values, each consisting of one bit. The stack has the following input lines:

Clock

POP

PUSH

input data

and a single output line. The output line always reports the current top of the stack.

- (Recall that a stack pushes data onto the top of the stack, and pops data from the top of the stack. In other words, last in, first out. If more than four values are pushed on, older values are discarded.) You may use AND, OR, XOR, and NOT gates, etc; flip-flops of any kind; and/or decoders, multiplexers, etc.

Analog Circuits

- Design a common-emitter amplifier with output impedance $10K\Omega$ and a gain of 100 using a transistor of $\beta=200$ and a 24V power supply.
- Design a two stage RC coupled BJT amplifier to meet the following specifications.
- $A_v \geq 5000$, $S_{ico} \leq 10$, $f_l = 20\text{Hz}$, $V_o=2V_o$, $V_{cc} = 15\text{V}$.
- Calculate A_v , R_i and R_o of designed circuit.
- Design a cascode amplifier stage using bipolar transistors to drive a load resistor of $100\ \Omega$. The amplifier output is to be time varying signal of $\pm 600\text{mV}$. The overall performance of the amplifier is specified as:

Operating current for cascode stage collectors = 1,2mA

Overall gain = -30

DC power supply +15V

- Design the basic BJT differential amplifier to provide a differential input resistance of at and a differential voltage gain of 100 V/V. The transistor β is specified to be at least 100. The available positive power supply is 5V.
- Design a CMOS cascode amplifier with the following specifications:

DC gain = 2500

Gain-Bandwidth product = 100MHz.

Load capacitance = 1 pF

- Design a saw tooth generator using a 555 timer having pulse duration of 10 sec and peak voltage of 5V.

SEMESTER - VI B.E INFORMATION TECHNOLOGY

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	ITR6C1	WIRELESS PROTOCOLS AND MOBILE NETWORKS	PC	3-1-0	4
2	ITR6C2	DESIGN AND ANALYSIS OF ALGORITHMS	PC	3-1-1	4+1(P)
3	ITR6C3	NETWORK AND INFORMATION SECURITY	PC	3-1-1	4+1(P)
4	ITR6EX	--	PE	3-1-1	4+1(P)
5	ITR6G4	COMPILER DESIGN	GE	3-1-0	4
6	ITR6L4	MOBILE TECHNOLOGY LAB	-	3-1-0	1(P)
7	SIR6S6	ENTERPRENUERSHIP DEVELOPEMENT & IPR	-	0-0-1	2
8	ITR6V6	COMPRHENSIVE VIVA- VI	VIRTUAL	0-0-4	4
				TOTAL CREDIT	30
PROGRAMME ELECTIVE					
1	ITR6E1	SOFTWARE TESTING ANG QUALITY ASSURANCE	PE	3-1-1	4+1(P)
2	ITR6E2	BIOINFORMATICS	PE	3-1-1	4+1(P)
3	ITR6E3	INFORMATION RETRIEVAL AND EXTRACTION	PE	3-1-1	4+1(P)
4	ITR6E4	HIGH PERFORMANCE COMPUTING	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India				III Year B.E. Information Technology			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ITR6C1	L	T	P	L	T	P	Total
WIRELESS PROTOCOLS AND MOBILE NETWORKS							
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Learning Objectives:

- To understand the basic concepts of wireless communication with focus on mobile networking.
- To provide knowledge of different techniques of wireless communication.
- To learn about integration of services and applications from fixed networks into mobile networks.

Prerequisite: Basic knowledge of Computer Networks.

COURSE CONTENTS

UNIT I

Introduction: Wireless Networks, Wireless vs Wired Networks, mobile devices, mobile applications, mobile environments and limitations, Wireless transmission-frequencies and regulation, multipath propagation, channel fading, Multiplexing and Modulation techniques, Spread spectrum-DSSS & FHSS,

UNIT II

Medium Access Control: motivation for specialized MAC, Hidden/Exposed, Near/Far terminal effect, MAC protocols –SDMA,FDMA,TDMA, Reservation Aloha, PRMA, MACA, DSMA etc.

Cellular networks : overview, Cellular Concept and Frequency Reuse, Channel Allocation, Call Setup, Cell Handoffs, Location Management, CDMA, GSM- Architecture, GSM-Air Interface, protocols, HLR/VLR, localization & calling, security, GPRS.

UNIT III

Wireless LAN : Infra vs Radio transmission, infrastructure vs ad hoc network, IEEE 802.11-system and protocol architecture, MAC management, IEEE 802.11 flavours, Bluetooth – architecture, radio and basband layer, L2CAP, IEEE 802.15, WiMax and Zigbee overview

UNIT-IV

Mobile Network Layer: Entities, Packet delivery, Agent Discovery, Tunneling and encapsulation, optimization, reverse tunnelling, **Mobile Transport Layer:** Congestion control and implication of mobility, slow start, Mobile TCP – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ Fast recovery. **Support for Mobility** – File System – CODA, WAP –Architecture,

UNIT-V

Mobile Adhoc Networks: Protocols and Routing,

Advances in Mobile Technologies: 5G and Beyond, Internet of Things (IoT), Internet of Every Thing (IoE), Wireless Sensor Networks, Mobile Opportunistic Networks

Wireless Network Planning and Administration: Wireless Hardware, Wireless Network Design and Deploy, Troubleshooting hardware and connection issues.

Learning Outcomes:

Upon completing the course, students will:

- Be familiar with wireless communication methodologies
- Learn wireless communication protocols and different standards
- Be able to apply these concepts in Wireless Network planning, design and administration to support mobility.

BOOKS RECOMENDED:

- [1]. Jochen Schiller, Mobile Communications, Pearson Education, 2/e, 2003.
- [2]. W. Stalling, Wireless Communications & Networks, Pearson Education, 2/e, 2005.
- [3]. Dharma P. Agrawal and Qing-An Zeng, Introduction to Wireless and Mobile Systems, Cengage Publication, 2012.
- [4]. Wale Soyinka, Wireless Network Administration- A Beginner's Guide, Tata McGraw-Hill Edu, 2010.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Information Technology (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ITR6C2 DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	1	5

Learning Objectives:

- Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
- Knowledge of algorithm design strategies
- Familiarity with an assortment of important algorithms
- Ability to analyze time and space complexity

Prerequisite: The students are required to have familiarity with the following data structures: Arrays and linked lists, Stacks and queues, Graphs and trees, binary search trees, height balancing, Heaps and priority queues

COURSE CONTENTS

UNIT I

Introduction to Algorithms: Notion of algorithms, properties, important areas of research in connection with the study of algorithms, Types of algorithms; Analysis- best case, worst case, and average case. Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

UNIT II

Selected Algorithms for Sorting, Searching and matrix multiplication: Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements. Divide-and-Conquer strategy, Strassen's matrix multiplication.

UNIT III

Greedy Method and Dynamic Programming: Algorithms design techniques based on Greedy Method and Dynamic programming. Illustration of these strategies using appropriate examples including Knapsack problem, optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, and Matrix chain multiplication problem.

UNIT IV

Backtracking, Branch-and-Bound, and String Matching: Backtracking and Branch-and-Bound algorithm design techniques, Illustration of these techniques using appropriate examples like Queens Problem, subset sum problem, traveling salesperson problem, etc. Introduction to string matching problem, Applications, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc.

UNIT V

The Theory of NP-Completeness: Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Decision and optimization problems, Tractable and Intractable Problems, Computational Classes: – P, NP, NP-Complete, and NP-Hard; reducibility, Selected NP-Complete and NP-Hard problems: Hamiltonian cycle, Traveling Salesperson (TSP). Satisfiability, Clique problems, etc.

Learning Outcomes:

Students who have completed this course should be able to:

- Apply design principles and concepts to algorithm design
- Have the mathematical foundation in analysis of algorithms
- Understand different algorithmic design strategies
- Analyze the efficiency of algorithms using time and space complexity theory

Assessment methods of all of the above: quizzes, exams, assignments, practicals

BOOKS RECOMENDED:

- [1]. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, MIT Press/McGraw-Hill, 2001.
- [2]. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
- [3]. Jon Kleinberg and ÉvaTardos, Algorithm Design, Pearson, 2005.
- [4]. E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
- [5]. Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 2/e, 1988.
- [6]. Knuth, D, The art of computer programming, Vols. 1-2-3, Addison Wesley 1968-73.
- [7]. A V Aho, J E Hopcroft& J D Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.

[8]. Vijay V Vazirani, Approximation Algorithms, Springer-Verlag, 2001

Devi Ahilya University, Indore, India				III Year B.E. Information Technology			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ITR6C3	L	T	P	L	T	P	Total
INFORMATION AND NETWORK SECURITY							
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- To impart the knowledge and in-depth reference to current information and network security standards and procedures.
- This course provides you with an overview of data and computer security and concentrates in technical and continuity management issues.
- Allow the student to gain expertise in some specific areas of information security such as the design and providing security to individual networks.

Prerequisites: Basic knowledge of programming and computer Networks

COURSE CONTENTS

UNIT I

Introduction: The need for security, security approaches, principles of security, services, mechanisms & attacks, model for network security. Plain & Cipher text, substitution & transposition techniques play fair cipher, hill cipher, stenography, key range & key size.

UNIT II

Symmetric Key Algorithms: Deffie-Hellman key exchange, An general idea of symmetric key cryptography, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

UNIT III

Asymmetric Key Algorithms: Brief account and general idea of asymmetric key cryptography, RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

UNIT IV

Information Security Protocols: Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3- D Secure Protocol, Email Security, and Kerberos.

UNIT V

Network Security: Introduction, brief introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing. Introduction to block chain technology and crypto currency.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Acquire a practical overview of the issues involved in the field of information security.
- Demonstrate a basic understanding of the practice of IS, especially in evaluation of information security risks across diverse settings including the Internet and WWW based commerce systems, high bandwidth digital communications and funds transfer services.
- The learning outcome is students shall be able to understand what are the common threats faced today, what are the foundational theory behind information security, what are the basic principles and techniques when designing a secure system, how to think adversarial, how today's attacks and defences work in practice, how to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.
- Familiarity with the basic protocols of Information Security, and how they can be used to assist in network security design and implementation.

BOOKS RECOMMENDED:

[1]. Douglas R. Stinson; Cryptography Theory and Practice; 2nd Edition, Chapman & Hall/CRC

[2]. Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education Bernard

[3]. Menezes; Network Security and Cryptography; Cengage Learning India Pvt Ltd.

[4]. Neal Krawetz; Introduction to Network Security; 2nd Edition, Thomson Learning Inc.

List of Practical Assignments:

During learning of course, students need to do assignments:

- Implementation of various symmetric key algorithms.
- Implementation of various asymmetric key algorithms.
- Implementation of Algorithm types and modes (Electronic Code Book (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB)).

- Study of Pretty Good Privacy open source security tool for e mail security.
- Implementation of digital certificates.
- Study of IP Tables.
- Implementation of various open source security tools (Wireshark, nmap, iptables, pretty good privacy, Snort, LC5, OpenVPN, TrueCrypt, THC Hydra).

Devi Ahilya University, Indore, India				III Year B.E. Information Technology			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ITR6E1	L	T	P	L	T	P	Total
SOFTWARE TESTING AND QUALITY ASSURANCE							
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

To develop software testing skills and create awareness about software quality assurance processes.

Prerequisite: Good knowledge of software Engineering and programming.

COURSE CONTENTS

UNIT I

Software Testing Principles: Fundamental of software testing: History, Prerequisite for testing, Testing Principles and Concepts, Scope of testing, testing constraint, software development Life cycles (SDLC), Agile software development, software testing life cycle (STLC), 'V' concept of testing, challenges in testing, Testing process: fundamental test process, role and responsibility.

UNIT II

Verification and Validation: Levels of testing: Unit, Integration and System Testing, Acceptance testing, Test case Planning, Test case Design, Test case template, Test case execution, Test case misconception, Test case management.

UNIT III

Static and Dynamic Testing: White Box Testing techniques and methodology, statement coverage, branch coverage, single /multiple condition coverage, data flow coverage. Black Box Testing: boundary value analysis, Equivalence partitioning, System testing: functional and non-functional testing, Acceptance testing, Integration testing, database testing.

UNIT IV

Testing Strategies: Bug, bug life cycle, defect management life cycle, defect severity and

priority, test matrices, fuzz testing, special testing: UI testing, load testing, stress testing, performance testing, configuration testing, compatibility testing, security and recovery testing. Factors and Methodology for Performance testing, Regression testing: Methodology for Regression testing.

Mobile apps testing: Mobile app testing (popular apps), game testing, mobile testing tools:

Appium, Calabash, Monkey Talk, Robotium, EggPlant. **Case study:** Social Media, compiler, project under ISRO, NASA, DRDO, System Driver, kernel. Hard real time applications testing.

UNIT V

Quality Assurance & Automation: Quality Assurance and Software Quality management, CMM levels, CMMI, ISO 9000 standard, Metrics for software quality, Risk management, Automation Testing tools: QTP (10.0), VSTS - WebTest, Load Runner, Performance Testing, Selenium

Bug management tools: Bugzilla, Winrunner, TestDirector

Learning Outcomes:

Upon completing the course, students will be:

- Familiar with software testing tools and techniques, and software quality assurance processes.
- Able to apply skills for quality software development as per requirement.

BOOKS RECOMENDED:

[1]. Srinivasan Desikan & Gopalswamy Ramesh "Software testing Principles and Practices" Pearson education, 2006

[2]. R. Patton; Software Testing; Techmedia (SAMS) 2000

[3]. Glenford J. Myers, "The Art of Software Testing ", John Wiley & Sons, 1979.

[4]. Boris Beizer, Black-Box Testing: "Techniques for Functional Testing of Software and Systems ", John Wiley & Sons, 1995.

[5]. Beginner's Guide for Mobile Applications Testing Paperback – 28 May 2015 by Jeesmon Jacob

[6]. How to Test Mobile Applications: A Practical Guide to Mobile Application Testing Kindle Edition by Kishore Nuvvula

[7]. Software Testing Tools by K.V.K.K Prasad.

List of Practical Assignments:

- Students are given programming assignments to learn following:
- SDLC, agile and STLC phases.
- Test website performance with different parameters using GTmatrix, PageSpeed.
- Check Web Browsers performance for loading websites.(as IE, Mozilla, Opera, Chrome, UC Browser.
- Prepare & execute test cases for application and system software.

- Perform load testing for web application using LoadRunner, Jmeter, WebLOAD. Perform web security testing using AppScan, WebScarab.
- Perform automation testing using selenium & QTP 10.0(UFT).
- Execute mobile app testing using Appium, calabash, MonkeyTalk, Robotium, Eggplant.

Devi Ahilya University, Indore, India				III Year B.E. Information Technology			
Institute Of Engineering & Technology				(Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ITR6G4	L	T	P	L	T	P	Total
COMPILER DESIGN							
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Learning Objectives:

- Provide a framework for understanding the fundamentals of Compiler. To familiarize students with new Compilation Problems.
- Develop skills to understand how to Design a Compiler.
- Develop ability to understand how to enhance performance of a Compiler for newly evolved Programming Languages.

Prerequisite: Knowledge of Computer Programming, Data Structures, Discrete Mathematics. Knowledge of several different Programming Languages will be useful.

COURSE CONTENTS

UNIT I

Introduction to Compiling: Compilers: The Analysis-Synthesis Model of Compilation; Analysis of the Source Program: Lexical Analysis, Syntax Analysis, Semantic Analysis; The Phases of a Compiler: Symbol-Table Management, The Analysis Phases, Intermediate Code Generation, Code Optimization; Cousins of the Compiler: System Software, Interpreters, Preprocessors, Assemblers, Linkers and Loaders, Macros; The Grouping of Phases: Front and Back Ends, Passes; Compiler Construction Tools.

UNIT II Lexical Analysis: The Role of the Lexical Analyzer: Lexical Analysis Versus Parsing, Tokens, Patterns and Lexemes, Attributes for Tokens, Lexical Errors; Specification of Tokens: Strings and Languages, Regular Expressions; Recognition of Tokens: Transition Diagrams; Finite Automata: Nondeterministic Finite Automata, Deterministic Finite Automata; From Regular Expression to Automata: Conversion of an NFA to DFA, Construction of an NFA from a Regular Expression.

UNIT III Syntax Analysis: Introduction: The Role of the Parser, Classification of Grammars; Context-Free Grammars: Parse Tree and Derivations, Ambiguity, CFG Versus Regular Expressions; Writing a Grammar: Lexical Versus Syntactic Analysis, Eliminating Ambiguity; Top-Down Parsing: Recursive Descent Parsing, LL(1) Grammars, Nonrecursive Predictive Parsing;

Bottom-Up Parsing: Reductions, Shift Reduce Parsing; LR Parsing: Simple LR, Constructing SLR-Parsing Tables, Constructing LALR Parsing Tables.

UNIT IV

Intermediate-Code Generation and Run-Time Environment: Variants of Syntax Trees: Directed Acyclic Graphs for Expressions; Three Address Code: Addresses and Instructions, Quadruples, Triples; Type Checking: Rules for Type Checking, Type Conversions; Storage Organization: Static Versus Dynamic Storage Allocation; Stack Allocation of Space: Activation Trees; Introduction to Garbage Collection.

UNIT V

Code Optimization and Planning a Compiler: Basic Blocks and Flow Graphs: Basic Blocks, Flow Graphs; Optimization of Basic Blocks: The DAG Representation of Basic Blocks, Local Common Subexpressions Elimination, Semantic Preserving Transformations; Loop Optimization; Virtual Machines and their Interpreters; The LLVM Modular and Reusable Compiler Technologies, Overview of The HiPE Compiler; Case Studies of Compilers and Future Trends: The Sun Compilers for SPARC, The IBM XL Compilers for the POWER and POWERPC Architecture.

Learning Outcomes:

- Upon completing the course, students will be:
- Acquire advance knowledge and understanding of Compiler. Use skills in Compiler Design.
- Apply acquired knowledge to improve performance of a Compiler.
- In addition to development in technology computer architectures offers a variety of resources of which students will be able to innovate in the Compiler Design.

BOOKS RECOMENDED:

- [1]. Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.
- [2]. Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.
- [3]. System Programming: D M Dhamdhare; McGraw Hill Education.
- [4]. System Programming and Operating Systems: D M Dhamdhare; McGraw Hill Education.

Suggested Exercises:

For a Defined Language:

- Design a symbol table mechanism.
- Write an interpreter for quadruples.
- Write the lexical analyser.
- Write the semantic actions

- Write the parser.
- Write the error-handling routines.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Information Technology (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ITR6L4 MOBILE TECHNOLOGY LAB	L	T	P	L	T	P	Total
Duration Of Theory Paper:	0	0	2	0	0	1	1

Learning Objectives:

- To learn Android programming skills to develop mobile applications for modern computing requirements.
- To provide knowledge of different mobile technologies.
- To familiarize students with Android operating system.
- To provide knowledge of Android programming language and platform. Develop skills to design and implement various Mobile applications.

Prerequisite: Programming Concepts. Programming languages, Core JAVA, Database

COURSE CONTENTS

UNIT I

Introduction: Introduction to Android architecture and core building blocks, Installing Android SDK and Software Stack, mobile App APK ;

Android UI Design: Working with buttons & other components, Activity lifecycle, Intent – implicit and explicit, Fragment lifecycle, Menu, Layout manager, Adaptor and view;

UNIT II

Android Service & Data Storage: Introduction, Android service API, Android service life cycle, Shared preferences, internal storage, external storage, SQLite, XML & JSON.

UNIT III

Android Content Provider & Notification: Contact content provider, other built-in content providers, Understanding content URI, Content Resolver, Content sharing, Content Searching, Notification API, Setting notification properties, issuing notification

UNIT-IV

Android APIs & Connectivity: Overview of TextToSpeech API, Telephony API, Location API and Sensor API, Bluetooth API, Wi-Fi API:Creating P2P Connections with Wi-Fi, Using Network Service Discovery, Using Wi-Fi P2P for Service Discovery, Networking Operations: Connecting to the network, Managing network uses, Parsing XML Data;

UNIT-V

Best Practices: Interaction & Engagement, User Interface, User Input, Background Jobs, Performance, Security & Privacy, Permissions & Identifiers;**Testing Apps on Android :**Fundamentals of Testing, Building Effective Unit Tests ,Automating UI Tests, Testing App Component Integrations, Testing UI Performance, Espresso ;Using google play to distributing;

Learning Outcomes:

Upon completing the course, students will be familiar with Android architecture, operating system and its SDK. Able to develop mobile applications using Android technology.

BOOKS RECOMMENDED:

- [1]. Programming Android by Z. Mednieks, L. Dornin, G. Blake, M. Nakamura, Oriely'spublication. 2e
- [2]. Professional Android™ 4 Application Development by Reto Meier, John Wiley & Sons publication.
- [3]. Beginning Android™ 4 Application Development by Wei-Meng Lee, John Wiley & Sons publication. 1e
- [4]. Android Programming for Beginners by John Horton, Packt Publishing Ltd. 1e
- [5]. <https://developer.android.com/Training/Index.html>
- [6]. https://www.Tutorialspoint.com/Android/Android_Tutorial.Pdf

List of Practical Assignments:

Students are given programming assignments to learn following:

- How to install Android SDK and create environment.
- Concepts of activity and apply activities
- Techniques of designing layout, fragment, views and menu with view.
- Concept of Android service API's and storages.

- To work with database interface (Sqlite).
- Concepts of using server side database.
- To work with content provider for data sharing, searching, Saving and Loading User Preferences,
- Concept of networking using API's.(use of Wifi, Bluetooth, GPS)
- A project to be developed which uses the above concepts

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Information Technology (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
SIR6S6 ENTERPRENUERSHIP DEVELOPMENT & IPR	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	2	-	-	2	-	-	2

Learning Objectives:

- To provide awareness about entrepreneurship.
- To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
- To self motivate the students by making aware of different opportunities and successful growth stories
- To impart the basics of Intellectual property Rights.

Pre requisite: Nil

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise- Definition and Classification (MSME- Micro, Small & Medium Enterprises). **Case Study:** Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model.

Class Activity: Idea generation by students.

UNIT III

Business Plan for Start-ups in IT Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks.

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1]. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2]. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications, New Delhi, 2011.
- [3]. N.K. Acharya, Text book on intellectual Property Rights, Asha Law House New Delhi, New Edition, 2001.

SEMESTER - VI B.E ELECTRONICS & TELECOMMUNICATION ENGINEERING

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	ETR6C1	VLSI DESIGN	PC	3-1-0	4
2	ETR6C2	MOBILE AND WIRELESS COMMUNICATION	PC	3-1-1	4+1(P)
3	ETR6C3	CONTROL SYSTEM	PC	3-1-1	4+1(P)
4	ETR6EX	--	PE	3-1-1	4+1(P)
5	ETR6G4	COMPUTER NETWORKS	GE	3-1-0	4
6	ETR6L4	DESIGN WORKSHOP	-	0-0-1	1(P)
7	STR6S6	ENTERPRENEURSHIP AND IPR DEVELOPEMENT	SS	2-0-0	2
8	ETR6V6	COMPRHENSIVE VIVA- VI	VIRTUAL	0-0-4	4
			TOTAL CREDIT		30
PROGRAMME ELECTIVE					
1	ETR6E1	LINEAR INTEGRATED CIRCUITS	PE	3-1-1	4+1(P)
2	ETR6E2	MULTIMEDIA COMMUNICATION	PE	3-1-1	4+1(P)
3	ETR6E3	SOFT COMPUTING TECHNIQUES	PE	3-1-1	4+1(P)
4	ETR6E4	INDUSTRIAL AND MEDICAL ELECTRONICS	PE	3-1-1	4+1(P)
5	ETR6E5	MODELING AND SIMULATION	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ETR6C1 VLSI DESIGN	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Learning Objective: This course presents the fundamental of Digital CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisites: Knowledge of Digital Circuit and Basics of Semiconductors is required.

COURSE CONTENTS

UNIT I

VLSI design flow, VLSI design style, introduction to the basic fabrication processes (wafer preparation, oxidation, diffusion, etching, metallization and lithography, etc.), Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor.

UNIT II

Threshold voltage equation and energy band diagram of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances. Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter

UNIT III

Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect

of threshold voltage and supply voltage on Delay and power dissipation. Limitations of CMOS in NANO scale circuit design.

UNIT IV

CMOS logic, Complex Logic Circuits, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit using CMOS and analysis of various design parameters.

UNIT V

Sequential MOS Logic circuits , SR Latched circuits, clocked latch and Flip Flop Circuits, CMOS D latch and Edge Triggered Flip Flop, Design of the Schmitt trigger circuit, Dynamic random access and Static random access memory cell design and analysis, Sense amplifier and row and column decoder circuit.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Understand the static and dynamic behavior of MOSFETs (Metal Oxide Semiconductor Field Effect Transistors) and the secondary effects of the MOS transistor model.
- To be aware about the trends in semiconductor technology, and how it impacts scaling and its effect on device density, speed and power consumption.
- To understand MOS transistor as a switch and its capacitance.
- Student will be able to design digital systems using MOS circuits (Static and Switching characteristics of inverters)
- Able to learn Layout, Stick diagrams, Fabrication steps.
- Understand the concept behind ASIC (Application Specific Integrated Circuits) design and the different implementation approaches used in industry.

BOOKS RECOMMENDED:

- [1]. Sung-mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuit analysis and Design, Tata McGraw-Hill, 3/e.
- [2]. R. Jacob Baker, Harry W. Li and David E. Boyce, CMOS Circuit design, layout and Simulation, PHI,IEEE press, Series Edition,
- [3]. Yuan Taur and Tak H. Ning, Fundamentals of Modern VLSI Devices, Cambridge university Press, Special Edition, 1998
- [4]. Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, PHI, 2/e
- [5]. Jan M. Rabaey, Digital Integrated Circuit, PHI, 2/e

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ETR6C2 MOBILE AND WIRELESS COMMUNICATION DESIGN	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives: The course contents are aimed to provide:

- Evolution of mobile communication system from 1G to 5G.
- Understanding of various transmission and reception techniques used in different mobile communication systems.
- To know the importance of communication channel in performance of mobile communication system.

Prerequisites: Knowledge of analog and digital communication systems.

COURSE CONTENTS

UNIT I

Introduction to Wireless Communication: Classification of different wireless communication networks, Transceiver techniques for Mobile wireless communication - Modulation, Channel Coding, Speech Coding, Spread spectrum Modulation, Multiple Access Techniques, Duplexing.

UNIT II

Channel Characterization: Characterizing Mobile-Radio Propagation, Large-Scale Fading, Path loss models, Small-Scale Fading, Types of small scale fading, fading parameters – Coherence time, coherence BW, Delay spread, Doppler spread. Models for Fading channel-Rayleigh Fading and Rician distribution for fading channel, Fading mitigation techniques - Equalization Techniques, Diversity Techniques, RAKE Receiver, OFDM.

UNIT III

Introduction to Cellular Mobile System: A basic cellular system, Performance criteria, Concept of frequency reuse channels, C/I ratio, cell splitting, sectoring, types of non co-channel interference, co-channel interference: measurement & reduction factor, Frequency management, Channel Assignment, Handoffs, Dropped call rate.

UNIT IV

GSM: System architecture, Air interfaces, Multiple access, Channel organization and framing structure, Call set-up procedure, Protocols and signaling, Authentication and security.

CDMA: CDMA Evolution, CDMA IS-95 systems - its forward and reverse links, PN sequence related to IS-95, Power control, Trans receiver techniques used in CDMA, call processing steps, Hand-off process.

UNIT V

Advanced Mobile Networks: Wireless Networks GPRS, EDGE, 3G-UMTS, Wi-max, WLAN, their architecture and working. Overview of IP and Mobile IP, Introduction to 4G & 5G systems.

Learning Outcomes:

Upon Completing the Course, Student will able to learn

- Various processes and their types involved in mobile communication system.
- Current and future Mobile communication standards and techniques used in standards.

BOOKS RECOMMENDED:

- [1].S Misra, "Wireless Communications and Networks" 3G and Beyond, Second Edition, Mc Graw Hill, 2013.
- [2].A F Molisch, Wireless communication, Second Edition, Wiley Publication, 2014.
- [3].A Biswas, M Chaudhary, Wireless Communication, Theory and Applications, Cambridge University Press, First Edition, 2017.
- [4].T.S.Rappaport, "Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.
- [5].W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.

List of Practical Assignments:

Note: Assignments has to be performed using MATLAB.

Assignment I : Performance evaluation of Mobile communication system in presence of various digital modulation techniques.

- To evaluate the performance of MPSK for $M=2,4,8,16$ and their comparison study.
- To evaluate the performance of MFSK for $M=2,4,8,16$ and comparison study.
- Compare the performance of MSK & QPSK techniques.
- How will select a particular modulation technique for a particular application.

Assignment II : Performance evaluation of mobile communication system in presence of various error correcting codes .

- To evaluate the performance of Hamming code.
- To evaluate the performance of Convolution code.
- Performance comparison of these two codes.
- How will select a particular channel code for a particular application.

Assignment III : Performance evaluation of mobile communication system in presence of various communication channels.

- To evaluate the performance of AWGN channel.
- To evaluate the performance of Rayleigh channel.
- To evaluate the performance of Rician channel
- Performance comparison of different communication channels.
- What will be the impact of a communication channel on the performance of digital communication system.

Assignment IV : Performance evaluation of digital communication system in presence of various equalizers using.

- To evaluate the performance of linear equalizers.
- To evaluate the performance of adaptive equalizers.
- Performance comparison of different equalizers.
- What will be the impact of an equalizer on the performance of digital communication system.

Assignment V : Simulate a mobile communication system and evaluate its various performance measures.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ETR6C3 CONTROL SYSTEM	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

- To provide the fundamental knowledge of control system engineering and the concept of mathematical modelling of the physical system.
- The subject gives various classical analysis tools for design and stability of system in time and frequency domain.

Prerequisites: Knowledge of Laplace transforms, Z-transform, Basics of MATLAB & Simulink.

COURSE CONTENTS

UNIT I

Introduction to the control system & Physical modeling: Basic component of control system (CS), open-loop CS (non-feedback system), close-loop CS (feedback CS), Types of feedback CS- linear and non-linear CS, time-invariant and time variant CS, single variable and multivariable control system.

Effect of feedback on-overall gain, stability, sensitivity, external disturbance or noise, Block diagram representation of CS, Block diagram reduction rules, Transfer function (TF), Poles-zero concept, Signal flow graph (SFG), Mason's gain formula.

Modeling of CS- electrical networks, mechanical systems-translational and rotational mechanical system, analogy concept- force to voltage (F-V) and force to current (F-I) analogy.

UNIT II

Time domain analysis & Stability: Time response of continuous-data system, Standard test signals, Time response of prototype first and second order CS, Performance specifications of prototype I & II

order systems, Steady-state errors and error constants (positional, velocity, acceleration), Effect of adding Poles and Zeroes to open-loop and close-loop transfer function (TF), Concept of Dominant poles of TF.

Types of controllers and their control action-proportional (P), integral (I), derivative (D), PID control, and derivative feedback control, MATLAB based problems.

Stability-Concept of stability, Necessary conditions for stability, Absolute and relative stability, Algebraic Criterion of stability- Routh Hurwitz Criterion. The Root locus concept, Guidelines for sketching Root-locus, Root contour.

UNIT III

Stability and Frequency domain analysis of CS: Frequency domain analysis- Concept of complex frequency, performance specification of frequency domain, Co-relation between time & frequency domain, Polar plot, Bode plot, Stability analysis in frequency domain- Nyquist Criterion, Stability margins-Gain and Phase margin, MATLAB Based Problems.

UNIT IV

Design of Feedback CS & State Space Analysis of CS: Approach to system design, Preliminary considerations classical design, Realization of basic Compensators-Lead, Lag, and Lag-lead compensator, Design of compensators in Time and Frequency domain.

Concept of State, State Variable, and State Model, State model representation of an LTI system, co-relation between State Model and TF, Solution of State Equations, Transfer Matrix, Concept of Controllability & Observability, MATLAB based problems.

UNIT V

Digital Control Systems: Block diagram representation of Digital Control System, Sampling process, Mathematical analysis of sampling process, Reconstruction of sampled signal, Pulse Transfer Function, Zero-order and first order hold circuit, Mapping of s-plane to z-plane.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the concept of LTI control systems, Importance of feedback in CS and stability concept.
- Able to Design a Stable Control System
- Understand the difference between Linear and Digital Control Systems.

BOOKS RECOMMENDED:

- [1] B.C. Kuo, *Automatic Control System*, 7/E, PHI, 2006.
- [2] I. J. Nagrath and M. Gopal, *Control Systems Engineering*, 5/E, New Age International Publishers, 2007.
- [3] M. Gopal, *Control Systems (Principles & Design)*, 5/E, Tata McGraw Hill, 2007.
- [4] Bishop & Dorf, *Modern Control System*, Addison Welseley.
- [5] Ogata, *Discrete-Time Control System*, 2/e, PHI, 1995.

List of Practical Assignments:

- Find the transfer function of various LTI control systems (open loop and close loop) using MATLAB command.
- Write a program to plot the poles and zeroes for the different sets of transfer function using MATLAB.
- Write a program to plot the time response of first and second order control system on impulse, unit-step, ramp and parabolic input signals using MATLAB. Also find the value of various transient response parameters.
- To determine the position, velocity and acceleration error coefficient of given transfer functions using MATLAB.
- Plot the root locus for various transfer functions using MATLAB command.
- Plot the Nyquist plot for the given transfer function using MATLAB. Also comment on the systems stability.
- Plot the Bode plot for the transfer function given below by using MATLAB.

$$G(s)H(s) = \frac{2(s+0.25)}{s^2 (s+1) (s+0.5)}$$

Also find (a) Phase cross over frequency (b) Gain cross over frequency (c) Gain margin (d) Phase margin.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ETR6E1 LINEAR INTEGRATED CIRCUITS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	2	3	1	1	5

Learning Objectives:

In-depth knowledge of Operational Amplifier including its circuit analysis, design and application.

Prerequisites: Analysis using R-parameter and feedback concept.

COURSE CONTENTS

UNIT I

Operational Amplifier Fundamentals: Amplifier Fundamentals, The Operational Amplifier ,Basic Op Amp Configurations, Ideal and practical Op Amp Circuit Analysis and characteristics ,Positive and Negative Feedback , Feedback in Op Amp Circuits , The Return Ratio and Blackman’s Formula , Op Amp Powering. Circuits with Resistive Feedback: Current-to-Voltage Converters, Voltage-to-Current Converters, Current Amplifiers, Difference Amplifiers, Instrumentation Amplifiers, Instrumentation Applications, Transducer Bridge Amplifiers. CMRR, offset error voltage and current.

UNIT II

Active filters I: The Transfer Function, First-Order Active Filters, Standard Second-Order Responses, *KRC* Filters, Multiple-Feedback Filters, State-Variable and Biquad Filters, Sensitivity. Active filters II: Filter Approximations, Cascade Design, Generalized Impedance Converters, Direct Design, The Switched Capacitor, Switched-Capacitor Filters, and Universal SC Filters

UNIT III

Static Op Amp Limitation: Simplified Op Amp Circuit Diagrams, Input Bias and Offset Currents, Low-Input-Bias-Current Op Amps, Input Offset Voltage, Low-Input-Offset-Voltage Op Amps, Input Offset Error and Compensation Techniques, Input Voltage Range/Output Voltage Swing, Maximum Ratings. Dynamic Op Amp limitation: Open-Loop Frequency Response, Closed-Loop Frequency Response,

Input and Output Impedances, Transient Response, Effect of Finite GBP on Integrator Circuits, Effect of Finite GBP on Filters, Current-Feedback Amplifiers.

UNIT IV

Stability: The Stability Problem, Phase and Gain Margin Measurements, Frequency Compensation of Op Amps, Op Amps Circuits with a Feedback Pole, Input-Lag and Feedback-Lead Compensation, Stability in CFA Circuits.

UNIT V

Designing- Adder, Subtractor, Integrator, Differentiator, Voltage follower, Comparator, Zero Crossing detector, Schmitt trigger, Peak Detector. Signal Generator: Sin wave generator, multivibrators, triangular and saw tooth wave generator, Log/Antilog amplifiers.

BOOKS RECOMMENDED:

- [1]. Millman & Halkias - Integrated Electronics, Tata McGraw Hill.
- [2]. Franco-Design with Operational Amplifiers & Analog Integrated Circuits, TMH
- [3]. Schilling & Belove-Electronic Circuit, Discrete & Integrated , TMH
- [4]. Gayakwad R.A- Op-Amps and Linear IC's, Pearson .
- [5]. Coughlin and Driscoll – Operational Amplifier and Linear Integrated Circuits – Pearson Education Asia.

List of Practical Assignments:

- To measure the gain of inverting & non-inverting amplifier.
- To analyze the voltage transfer characteristics of op-amp.
- To study the inverting adder & Subtractor configuration of op-amp.
- To study the non- inverting adder & Subtractor configuration of op-amp.
- To study the differentiator configuration of op-amp.
- To study the integrator configuration of op-amp.
- To study the low pass & high pass filter.

- To study the band pass & band reject filter.
- To study the zero crossing detector.
- To analyze the performance of comparator.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ETR6G4 COMPUTER NETWORKS	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Learning Objectives: The content covers the different types of computer networks, the layered approach of protocol stack, its advantage, and protocols of each layer.

Prerequisite(s): Fundamental knowledge of data transmission

COURSE OF CONTENTS

UNIT I

Computer network – Hardware, Software, Reference model, physical layer: Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast ,broadcast ,Network Topology – Mesh , Star ,Tree , Bus , Ring , Hybrid Physical Layer – Shannon’s maximum data rate of a channel, Transmission media – Guided as Magnetic, Twisted Pair, coaxial cable, fiber optics etc., wireless as radio wave, microwave, infrared

UNIT II

Data Link Layer: Framing techniques , Error detection-correction , Multiplexing-TDM ,FDM,WDM ; switching – circuit , message , packet switching , Repeaters, Hubs , Bridges ,switches ,routers and gateways ;Data link protocols -- unrestricted simplex protocol, stop & wait , sliding window ,Go-back-n ,selective repeat, data link layer in internet

UNIT III

Medium Access control sublayer:Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol

Ethernet- frame format, cabling, encoding, performance, fast Ethernet, gigabit Ethernet, Broadband and wireless LAN, Bluetooth

UNIT IV

Network layer: Connectionless – connection oriented service, comparison of virtual circuit and datagram subnet, Routing algorithms- shortest path , flooding ,distance vector , hierarchical routing , congestion control and prevention ,Quality of service , network layer in internet- IP protocol and IP address, IPv6, OSPF, BGP routing protocol

UNIT V

Transport layer and Application layer: Elements of transport protocol, internet transport protocol- UDP / TCP protocol, performance issues-Network performance measurement, system design for better performance Domain name system, email, world wide web- architecture, HTTP

Learning Outcome:

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

BOOKS RECOMMENDED

[1] Andrew S. Tannenbaum, Computer Networks, 4/E Pearson Education, 2003 ,

[2] William Stallings ,Data and Computer Communications , 8/E Prentice Hall India, 2007

[3] Behrouz A.Forouzan , Data Communications and Networking ,4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
ETR6L4 DESIGN WORKSHOP	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	0	0	2	0	0	2	2

DESIGN (Digital & Analog circuit)

- Design a 3 bit counter which counts in the sequence
001, 011, 010, 110, 111, 101, 001, ...
 - (a) Use clocked D flip-flops
 - (b) Use J-K flip-flop
- Design and Implement a 8-bit barrel shifter using 4 X 1 Multiplexers.
- Design a one-input, one-output serial 2's complementer. The circuit accepts a string of bits from the input and generates the 2's complement at the output. The circuit can be reset asynchronously to start and end the operation.
- Design a four- bit shift register with parallel load using D flip- flops. There are two control inputs: shift and load. When shift = 1, the content of the register is shifted by one position. New data are transferred into the register when load = 1 and shift= 0. If both
 - control inputs are equal to 0, the content of the register does not change.
- Design a 16-bit Magnitude comparator using IC 7485 (4-bit Magnitude comparator).
- Design a hardware stack to hold a maximum of four values, each consisting of one bit. The stack has the following input lines:

Clock

POP

PUSH

input data

and a single output line. The output line always reports the current top of the stack.

- (Recall that a stack pushes data onto the top of the stack, and pops data from the top of the stack. In other words, last in, first out. If more than four values are pushed on, older values are discarded.) You may use AND, OR, XOR, and NOT gates, etc; flip-flops of any kind; and/or decoders, multiplexers, etc.

Analog Circuits

- Design a common-emitter amplifier with output impedance $10K\Omega$ and a gain of 100 using a transistor of $\beta=200$ and a 24V power supply.
- Design a two stage RC coupled BJT amplifier to meet the following specifications.
- $A_v \geq 5000$, $S_{ico} \leq 10$, $f_l = 20\text{Hz}$, $V_o=2V_o$, $V_{cc} = 15\text{V}$.
- Calculate A_v , R_i and R_o of designed circuit.
- Design a cascode amplifier stage using bipolar transistors to drive a load resistor of $100\ \Omega$. The amplifier output is to be time varying signal of $\pm 600\text{mV}$. The overall performance of the amplifier is specified as:

Operating current for cascode stage collectors = 1,2mA

Overall gain = -30

DC power supply +15V

- Design the basic BJT differential amplifier to provide a differential input resistance of at and a differential voltage gain of 100 V/V. The transistor β is specified to be at least 100. The available positive power supply is 5V.
- Design a CMOS cascode amplifier with the following specifications:

DC gain = 2500

Gain-Bandwidth product = 100MHz.

Load capacitance = 1 pF

- Design a saw tooth generator using a 555 timer having pulse duration of 10 sec and peak voltage of 5V.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
STR6S6 ENTERPRENUERSHIP & IPR DEVELOPEMENT	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	3	1	0	4

Learning Objectives:

- To provide awareness about entrepreneurship.
- To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
- To self motivate the students by making aware of different opportunities and successful growth stories
- To impart the basics of Intellectual property Rights.

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise-Definition and Classification (MSME- Micro, Small & Medium Enterprises).

Case Study: Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model.

Class Activity: Idea generation by students.

UNIT III

Business Plan for New Ventures in Respective Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1]. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2]. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications, New Delhi, 2011.
- [3]. N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition, 2001.

SEMESTER - VI B.E CIVIL ENGINEERING

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	VLR6C1	STRUCTURAL ANALYSIS-I	PC	3-1-0	4
2	VLR6C2	TRANSPORTATION ENGINEERING-I	PC	3-1-1	4+1(P)
3	VLR6C3	DESIGN OF STEEL STRUCTURE-I	PC	3-1-1	4+1(P)
4	VLR6EX		PE	3-1-1	4+1(P)
5	VLR6G4	CONSTRUCTION AND PLANNING MANAGEMENT	GE	3-1-0	4
6	VLR6L4	TECHNICAL SKILLS		0-0-1	1
7	SVR6S6	PROFESSIONAL SKILLS- II		2-0-0	2
8	VLR6V6	COMPREHENSIVE VIVA-VI	VIRTUAL	0-0-4	4
				TOTAL CREDIT	30
PROGRAMME ELECTIVE					
1	VLR6E1	GEOTECHNICAL ENGINEERING-II	PE	3-1-1	4+1(P)
2	VLR6E3	DESIGN OF URBAN WATER SYSTEM	PE	3-1-1	4+1(P)
3	VLR6E4	REHABILITATION OF SYSYTEM	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR6C1 STRUCTURAL ANALYSIS-I	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	0	-	-	-	4

Learning Objective:

- To understand the concept of determinate and indeterminate structures, analyses of determinate and indeterminate structures.
- To understand the principle of virtual work and the application of influence line diagrams in structural analysis problems.

Prerequisite(s): Mechanics of Materials.

COURSE CONTENTS

UNIT I

Fundamental Concepts In Structures: Definition and Determination of Static and Kinematic Indeterminacy , Beams, Trusses and Frames , Degree of Freedom, Equilibrium and Kinematic Stability , Principle of Superposition , Basic Methods of Structural Analysis. **Virtual work and Energy Principles:** Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell’s Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

UNIT II

Slope Deflection Method: Analysis of Continuous beams and Rigid plane frames with and without sway.**Moment Distribution Method:** Stiffness and Distribution factors, Carry over factors, Analysis of Continuous beams, Plane rigid frames with and without sway**Kani's method and Column analogy method** applied to indeterminate beams.

UNIT III

Moving Loads And Influence Lines: Effect of moving load , Description of Influence line , Influence line for Reaction, Shear Force and Bending Moment , Load position , Absolute maximum bending moment , Muller Breslau's Principle , Application to beams with one degree of indeterminacy , Influence line for forces in members of determinate trusses.

UNIT IV

Analysis of Three Hinged and Two Hinged Arches : Parabolic and Circular principles of analyzing Fixed Arches, Influence lines for Three and Two hinged arches for Horizontal thrust, Shear force and B.M. at any section , absolute maximum bending moment, axial thrust **Suspension bridges:** Length of Cable, Maximum tension ,Types of supports, Forces in Towers,two hinged and three hinged stiffening girders, influence line diagrams for bending moment

UNIT V

Indeterminate Trusses : Energy method , application to analysis of indeterminate pin jointed Plane trusselackoffittemperatureeffects.

BOOKS RECOMMENDED:

- [1] Menon, D., "Structural Analysis", Alpha Science International, Limited, 2008.
- [2] Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Theory of Structures", Laxmi Publications, New Delhi, 12th Edition, 2004.
- [3] Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
- [4] Wang C.K. Intermediate structural analysis, McGraw Hill, New York. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
- [5] Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- [6] Pandit .G.S, "Theory Of Structures", Vol-I, McGraw-Hill Education (India) Pvt Limited, 1999.
- [7] Norris C.H., Wilbur J.B. and Utku. Elementry Structural Analysis, McGraw Hill International, Tokyo
- [8] Timoshenko. S.P & Young. D.H, "Theory of Structures",. McGraw Hill Book Company, International Ed. 1965.

Course Outcomes:

At the end of the course, the student will be able to:

Analyze one dimensional and two dimensional problems using classical methods

- Analyze indeterminate structures
- Analyze structures for gravity loads, moving loads and lateral loads

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR6C2 TRANSPORTATION ENGINEERING-I	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	1	4+1

Learning Objective:

- To know about railway planning and geometric design of railways.
- To know about highway planning and geometric design of roads.
- To know about highway maintenance and public transportation systems.

Prerequisite(s):NIL

COURSE CONTENTS

UNIT I

Railway: Introduction, Rails, Sleepers, Rail fastenings. fish bolts, spikes, bearing plates, chain keys, check and guard rails, Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track.

UNIT II

Railway: Geometric Design, Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipment, layouts, marshaling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

Unit III

Highway Planning and Alignment: Different modes of transportation , historical Development of road construction, Highway Development in India , Classification of roads, Road pattern , Highway planning in India, Highway alignment , Engineering Surveys for alignment , Highway project.

UNIT IV

Geometric Design of Highways: The highway cross sectional elements, Sight Distance ,Types of sight distances, Design of horizontal alignments , Super elevation, Widening of Pavements on horizontal curves- transition Curves, Design of Vertical alignments, Gradients- summit and Valley Curves.

UNIT V

Highway Maintenance and Public Transportation: Importance of highway drainage ,Surface Drainage, Subsurface drainage , Road construction in water logged areas, maintenance of various roads, History and present state of public transportation, role of public transportation in urban development, transit systems, route development.

BOOKS RECOMMENDED:

- [1] Khana .S.K, Justo .C.E.G – “Highway Engineering,” Nemchand & Bros, Rookies. 2001.
- [2] Chakroborty, P. and A. Das Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd, New Delhi, India, 2005.
- [3] Rangwala SC; Railway Engineering; Charotar Publication House, Anand
- [4] Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
- [5] Kadiyali .L.R, “Traffic Engineering And Transport Planning”, Khanna publishers, Delhi,2009.
- [6] Ministry of Road Transport and Highways. Specifications for Road and Bridge Works, Fourth Edition, Indian Roads Congress, New Delhi, India, 2001.
- [7] IRC Codes of Practices
- [8] Jotin Khisty C. and B. Kent Lall. Transportation Engineering – An Introduction, Third Edition. Prentice Hall of India Pvt. Ltd, New Delhi, India, 2002.

Course Outcomes: At the end of the course, the student will be able to:

- Design railway geometrics
- Plan highway networks
- Design highway geometrics.
- Understand the principles of construction and maintenance of highways

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR6C3 DESIGN OF STEEL STRUCTURE-I	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	1	5

Learning Objective:

- To learn the properties of steel sections and design basics and codal provisions Design of connections
- To design steel members subjected to tension and compression members
- Design steps involved in beams, built up beams and connections in beam column etc.
- Design of element in roof trusses, joints, etc. use of hand hooks in steel trusses design
- To design plate girders, gantry girders and light gauge sections

Prerequisite(s): Mathematical Methods and Mechanics of Materials.

COURSE CONTENTS

UNIT I

Introduction: Properties of structural steel, Structural steel sections, Limit state and working stress design concepts, Types of connections, Design of bolted, riveted and welded joints, Eccentric connections - Efficiency of joints, High Tension bolts.

UNIT II

Tension members and compression members: Types of sections, Net area, Net effective sections for angles and Tee in tension, Design of connections in tension members, Use of lug angles, Design of tension splice , Concept of shear lagTypes of compression members, Theory of columns, Basis of current codal provision for compression member design, Slenderness ratio, Design of single section and compound section compression members, Design of lacing and battening type columns, Design of column bases ,Gusseted base.

UNIT III

Beams: Design of laterally supported and unsupported beams, Built up beams, Beams subjected to biaxial bending , Design of plate girders riveted and welded , Intermediate and bearing stiffeners, Web splices

UNIT IV

Roof Trusses And Industrial Structures: Roof trusses , Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing , Design of gantry girder

UNIT V

Light Gauge Sections: Light gauge steel structures – Types of sections, Flat width ratio, Buckling of thin elements, Effective design width, Form factor, Design of tension, compression members and beams.

NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:800.

BOOKS RECOMMENDED:

- [1]. Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
- [2]. Design of steel structures by P. Dayaratnam
- [3]. Design of steel structures Vol. I & II by Ramchandra
- [4]. Design of steel structures by L.S. Negi
- [5]. Design of steel structures by Ramammutham
- [6]. Design of steel structures by Punmia
- [7]. Design of Steel Structures – Duggal.
- [8]. IS-800-2007.

Course Outcomes:

At the end of the course, the student will be able to:

- Design tension and compression members
- Design beams and beam columns
- Design bolt and weld connections
- Design built up members and column base

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR6E1 GEOTECHNICAL ENGINEERING- II	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	1	5

Learning Objective:

- Familiarize the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
- Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
- Familiarize the student with the procedures used for: a) bearing capacity estimation, b) load carrying capacity of pile, c) determining earth pressure and e) concept on stability of slope.

Prerequisite(s): Geotechnical Engineering - I.

COURSE CONTENTS

UNIT I

Shallow Foundations: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

UNIT II

Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

UNIT III

Soil Improvement Techniques: Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness. Soil stabilization : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilization and stabilization by grouting. Geo-synthetics, types, functions, materials and uses.

UNIT IV

Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

UNIT V

Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

BOOKS RECOMMENDED:

- [1] Punmia .B.C, “Soil Mechanics and Foundations Engineering”, Laxmi Publications Pvt.Ltd. New Delhi, 2005
- [2] Murthy V.N.S (2007): Soil Mechanics and Foundation Engineering – CBS publications, Delhi.
- [3] Das .B.M, “Principles of Foundation Engineering” (Fifth edition), Thomson Books, 2010.
- [4] Gopal Ranjan, Rao ASR (2000): Basic and applied soil mechanics – New age publication, Delhi.
- [5] Iqbal H Khan (2007): Geotechnical Engineering – Prentice Hall, Delhi.
- [6] Arora .K.R, “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 2011.
- [7] Bowles .J.E, “Foundation analysis and design”, McGraw Hill, 2001.

Course Outcomes:

At the end of the course, the student will be able to:

- Determine the earth pressures on foundations and retaining structures
- Analyze shallow and deep foundations
- Calculate the bearing capacity of soils and foundation settlements
- Understand soil exploration methods
- Understand the behavior of machine foundation under vibrations

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronic & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
VLR6G4 CONSTRUCTION PLANNING & MANAGEMENT	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	3	1	1	3	1	1	5

Learning Objectives:

- To study the concepts of construction resource planning, scheduling .
- To study the CPM and PERT models in the construction industry.
- To know the materials and equipment used in construction projects
- To make aware of labour management and regulations for construction activities
- To create awareness on resource leveling and resource allocation

COURSE CONTENTS

UNIT I

Preliminary and detailed investigation methods: Methods of construction, form work and centering. Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

UNIT II

Construction equipment: Factors affecting selection, investment and operating cost, output of various equipment, brief study of equipment required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

UNIT III

Contracts: Different types of controls, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

UNIT IV

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works. Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

UNIT V

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering. Problem of equipment management, assignment model, transportation model and waiting line models with their applications, shovel truck performance with waiting line method.

BOOKS RECOMMENDED:

- [1]. Construction Equipment by Peurify
- [2]. CPM by L.S. Srinath
- [3]. Construction Management by S. Seetharaman
- [4]. CPM & PERT by Weist & Levy
- [5]. Construction, Management & Accounts by Harpal Singh
- [6]. Tendering & Contracts by T.A. Talpasai

Course Outcomes:

At the end of the course, the student will be able to:

- Understand the roles and responsibilities of a project manager
- Prepare schedule of activities in a construction project
- Prepare tender and contract document for a construction project
- Understand safety practices in construction industry
- Identify the equipment used in construction

SEMESTER - VI B.E PART TIME MECHANICAL ENGINEERING

S.No	Subject Code	Subject Name	Type	L-T-P	Credits
1	MEP6C1	PRODUCTION ENGINEERING	PC	2-1-1	4
2	MEP6C2	FLUID MACHINES	PC	2-1-1	4
3	MEP6C3	ENERGY CONVERSION SYSTEMS	PC	2-1-1	4
4	MEP6G1	MACHINE DESIGN II	GE	2-1-0	3
5	MEP6V6	COMPREHENSIVE VIVA-VI	VIRTUAL	0-0-4	4
			TOTAL CREDIT		15(A) + 4(V)

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MEP6C1 PRODUCTION ENGINEERING	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	2	1	1	2	1	1	4

Learning Objectives:

The basic objectives of the subject are:

- To understand fundamentals of Machining Processes.
- To understand the applications of production processes for manufacturing industry.

Prerequisites: Material Science, Workshop Practice and Manufacturing Processes.

COURSE CONTENTS

UNIT I

Theory of Metal Cutting: Introduction, mechanics of metal cutting, oblique and orthogonal cutting, shear angle, rake angle and strain relationships, force and power relationships, heat generation and temperature rise in metal cutting, Machinability: criteria for evaluating machinability, factors affecting machinability, tool life and tool wear, variables influencing tool life, economics of metal cutting

UNIT II

Theory of Metal Forming: Introduction, plastic deformation and yield criteria, temperature and friction in metal forming, overview of metal forming, processes mechanics of forming processes, rolling, forging, drawing, deep drawing, bending, extrusion, punching-blanking, defects in metal forming, advantages & limitations of hot & cold forming.

UNIT III

Unconventional Machining Processes: Introduction, electric discharge machining (EDM), electrochemical machining (ECM), ultrasonic machining (USM), abrasive jet machining (AJM), laser beam machining (LBM), electron beam machining (EBM), plasma arc machining (PAM)

UNIT-IV

Surface Finish Measurement and Surface Treatment: Introduction, elements of surface roughness, evaluation and representation of surface roughness, effect of surface finish on functional properties, measurement of surface roughness, surface clearing surface treatment, diffusion and ion implantation, surface coating and deposition processes: surface plating ,conversion coating, physical vapour deposition, chemical vapour deposition, organic coating, porcelain enameling and other ceramic coatings.

UNIT-V

Processing of Particulate Metals, Ceramics-Composites and other Special Processing Technologies: Introduction, Basic processes, powder manufacture testing and blending, compacting, sintering, hot pressing, other techniques to produce high-density powder metallurgy products, properties of P/M products, advantages and limitation of powder metallurgy; processing of traditional ceramics, processing of new ceramics and cermets.

Shaping processes for Plastics and polymer matrix composites; processing of integrated circuits and micro fabrication technologies.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Develop the ability to apply the basic principles of production processes in manufacturing industries..
- To understand the basic concepts of Metal Cutting.
- Equipment used in non conventional machining processes.

BOOKS RECOMMENDED:

- [1].Sharma P. C., *Production Technology, Production Engineering*, S.Chand and Co, New Delhi, 1996.
- [2]. Pandey & Singh *Production engineering and science* Standard, Publ. & Distribution
- [3].HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd, 1993.
- [4].Amitabh Ghosh & Ashok Mullick *Manufacturing sciences* East west Pvt. Limited, New Delhi
- [5].Mikell P Groover *Fundamentals of modern manufacturing*, John Wiley & Sons, Inc, 2000

LIST OF PRACTICAL ASSIGNMENT

- Measurement of various features of tool geometry of a given single point tool using tool makers microscope.
- Measurement of various features of tool geometry of a drill bit and an end mill cutter using tool makers
- Measurement of a component features using a profile projector.

- Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
- Study of EDM machine.
- Machining of a work part as per given drawing on EDM machine.
- Machining of a work part as per given drawing on CNC lathe machine.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronis & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MEP6C2 FLUID MACHINES	L	T	P	L	T	P	Total
Duration Of Theory Paper: 3	2	1	1	2	1	1	4

Learning Objectives:

- To fundamentally understand the principle of fluid machines.
- To understand the working and operation different fluid machines.
- To model and simulate flow situations.
- To extend the theory to .related machines.

Prerequisite(s): Fluid Mechanics, Applied Mechanics, Engineering Thermodynamics, Applied Mathematics

COURSE CONTENTS

UNIT I

Fundamental Principles: Newton's Laws of Motion and Reynolds Transport Theorem; Conservation of Momentum: Linear Momentum Equation, Angular Momentum Equation; Forces on stationary and moving vanes, Forces on closed conduits: Reducer and Expanders, Bends, Torque on Sprinklers

UNIT-II

Modelling and Similitude: Dimensional Homogeneity, Dimensionless parameters, Methods to find Dimensionless numbers, Buckingham π Theorem applications, Similitude: Modelling Criteria; Modelling Laws; Distorted Models. Conservation of Mass and Momentum

UNIT III

Turbines: Hydraulic Turbines: Impulse and Reaction Turbines; Velocity triangles, Euler's Equation of Work Done, Efficiencies; Pelton, Francis, Kaplan, Propeller and Bulb turbine: Constructional details and Performance characteristics, Unit quantities, Specific Speed; Governing; Comparison with other Turbines: Steam Turbines, Gas Turbines, Jet Engines

UNIT IV

Pumps: Rotodynamic Pumps: Centrifugal, Axial; Constructional details, Performance Characteristics, Losses and Efficiencies, Net Positive Suction Head, Specific speed, Pumps in series and parallel; Multistage and Specific purpose pumps Positive Displacement Pumps: Types; Reciprocating Pumps: Indicator Diagram, Acceleration Head, Friction head, Air-Vessels, Double Acting Pumps

UNIT V

Cavitations and Water Hammers: Cavitations: Definition and Genesis, Effects on pumps and turbines, Thoma-Cavitation Factor, Measurement of Cavitation: Apparatus, Cavitation test, Prevention; Water Hammer: Physical phenomenon, fundamental equation, arithmetic integration, Prevention; Surge tanks; types and Role

Learning Outcomes:

- Upon completing the course, student will be able to
- Apply well-established concepts of the theory of fluid machines.
- Select Proper fluid machines.
- Operate and develop insight in maintenance.
- Develop a base for Computational Fluid Dynamics (CFD).

BOOKS RECOMMENDED:

- [1]. Douglas John F., *Fluid Mechanics*, Pearson Education, 2005.
- [2]. Dixon S.L., *Fluid Mechanics and Thermodynamics of Turbomachinery*, Elsevier, 5e, 2002, London.
- [3]. Modi and Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Rajsons Publication Pvt Ltd, N Delhi, 5e, 2000.
- [4]. Lal Jagdish, *Hydraulic Machines*, Metropolitan Book Company, 1995.

LIST OF PRACTICAL ASSIGNMENT

- To determine the coefficient of impact of water jet on vanes
- Performance evaluation of Pelton wheel using Pelton Wheel test rig
- Performance evaluation of Kaplan Turbine using Kaplan Turbine test rig
- Performance evaluation of Centrifugal Pump using Centrifugal Pump test rig
- Performance evaluation of Reciprocating Pump using Reciprocating Pump test rig.
- Measure forces on different shapes model using a wind Tunnel.
- Performance evaluation of Francis Turbine using Francis turbine test rig
- Numerical Study of modelling and similitude of rotodynamic fluid machines.
- Study the phenomenon of water hammer in pipes

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)				
Subject Code & Name		Instruction Hours Per Week			Credits			
MEP6C3 ENERGY CONVERSION SYSTEM		L	T	P	L	T	P	Total
Duration Of Theory Paper: 3		2	1	1	2	1	1	4

Learning Objectives:

- To make students to understand principal and operation of vapour power cycles.
- To develop the understanding of the combustion of fuel in boiler furnace.
- To make students to understand principal construction and working of different types of power boilers used in steam power plants
- To make them able to perform the testing to find boiler efficiency and heat balance sheet.
- To understand the operation and design of steam turbines, Nozzles, condensers and cooling towers.

Prerequisite(s): Engineering Thermodynamics, Thermal Engineering

COURSE CONTENTS

UNIT I

Vapour Power Cycles: Simple Rankine Cycles, Binary Vapour Cycles, Regenerative Cycles, Reheating Cycles, Combined Reheating-Regenerative Cycle, Water Extraction Cycle, Back Pressure, Pass-out and Mixed Pressure Turbine Cycles.

Power Station Economics: Elements of fixed and operating costs, power and various tariffs, definitions and applications of load curves, load factor, Capacity factor, plant-utilization factor, diversity factor and demand factor.

UNIT II

Steam Generators: Fuels and Combustion for Steam Generators. High-pressure steam boilers- Advantages of high pressure boilers, Lamont Boiler, Benson Boiler, Monotube Boiler, Loeffler Boiler, Velox Boiler, Revolving Boilers, Radiant Type boiler for power plants, Heat recovery steam generators(HRSG), Fluidised Bed Boiler, Super Critical Boilers, Draughts, Chimney calculations, Performance of Boiler- Equivalent Evaporation, Boiler Trial , Boiler Efficiency, Heat balance sheet, Overview of Boiler Codes.

UNIT III

Nozzles: Introduction, General flow analysis, Nozzle equation, , Types and Construction of Nozzles and Diffusers, Design Parameters, Theory of steam injectors, Flow through Nozzles and Diffusers, Nozzle Efficiency, Diffuser Efficiency, Critical Pressure Ratio, effect of friction on performance. Effect of Variation of Back Pressure.

UNIT IV

Steam Turbines: Steam Turbine types, Flow of Steam through Impulse Turbine Blades, Flow of Steam through Impulse-Reaction Turbine Blades, Energy Losses in Steam Turbines, State Point Locus, Reheat Factor, and Design procedure, Governing and Performance of Steam Turbines, Steam Turbine Auxiliary Systems, Construction, Stress Analysis, Operation and Maintenance of Steam Turbines.

UNIT V

Condensers and Cooling Towers: Functions of Condensers, Cooling Systems, Elements of Water Cooled Condensing unit, Types of Condensers- Jet Condensers, Surface Condensers, Condenser Vacuum and Measurement, Dalton's law of partial pressure, Mass of circulating water required, Air leakage, its effects and removal, Air cooling system, Design of condensers, Air Pumps, Vacuum Efficiency, Condenser Efficiency, Cooling Ponds and Cooling Towers, Analysis of Cooling Tower(Cooling efficiency, Range, Approach)

Learning outcomes:

- Upon Completing the Course, Student will be able to:
- Determine the overall efficiency of steam power plant through various arrangements of vapour power cycles.
- Determine the thermo chemistry of fuels and Actual air and Coal required in Furnace of boilers
- Understand the working of actual power boilers used in steam power plants, its chimney calculation and to perform the boiler trial for efficiency and input / output of heat
- Understand the working of steam nozzles and diffusers and determine the performance parameters and efficiency of steam nozzles
- Determine the Diagram Power, Gross Stage Efficiency, Specific steam consumption and Design parameters of steam turbines.
- Understand the construction, operation and Maintenance of Steam Turbines and its auxiliaries.
- Determine the performance parameters of Condensers, air pumps, cooling Towers.

BOOKS RECOMMENDED:

- [1]. Skrotzki & Vopat, *Power Station Engg. & Economy*, Mc Graw & Kagakush, 1960.
- [2]. Dr. R. Yadav, *Applied Thermodynamics*, Central Publishing House, 2012.
- [3]. Dr. R. Yadav, *Steam & Gas Turbines and Power Plant Engineering*, 2015.
- [4]. Arora S.C. & Domkundwar S. *Power Plant Engineering* Dhanpat Rai Sons, 2005.
- [5]. P.K. Nag, *Power Plant Engineering*, TMH, 2008.

LIST OF PRACTICAL ASSIGNMENTS

- To study the working of High Pressure Boilers.
- To Study the Induced Draught, Forced Draught and Balanced Draught.
- To find the boiler efficiency using Orsat's Apparatus.
- To study the Steam Nozzles and determine the Nozzle Efficiency.
- To study the Steam Turbines in any Thermal power plant.
- To study of Condensers and Cooling Towers and determine the Condenser Efficiencies.
- To study and determine the thermal efficiency of any thermal power plant in an Industrial Visit.
- To study and determine the thermal efficiency of cogeneration power plant in a Process Industry Visit.

Devi Ahilya University, Indore, India Institute Of Engineering & Technology				III Year B.E. Electronics & Telecommunication Engg (Full Time)			
Subject Code & Name	Instruction Hours Per Week			Credits			
MER6G1 MACHINE DESIGN- II	L	T	P	L	T	P	Total
Duration Of Theory Paper: 4	2	1	0	2	1	0	3

Learning Objectives:

- To provide the knowledge of fundamentals of designing the Mechanical Components.
- To introduce the designing of Internal Engine Components.
- To develop skill to analyze the component under dynamic loading.
- To introduce the importance of seals & gasket in Engine.

Prerequisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

UNIT I

Design of Power Transmission Elements: Design for single plate clutch, cone clutch, centrifugal clutch, flat belt, V belt, power screw, spur gear, helical gear and Bevel gear.

UNIT II

Design for Dynamic Loading: Stress concentration factor, design of parts subjected to Fatigue loading.

UNIT III

Design for Brakes: Design of shoe brakes, band brakes, block brakes, internal expanding brakes and disc brakes.

UNIT IV

Design for Internal Combustion Engine Parts: design for Engine cylinder, piston, connecting rod

UNIT V

Design of Crank Shaft , Concept of Seals and Gasket: Design of crank shaft, valves and valve gear mechanism Brief Introduction about seals and gasket.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Design the various components of Internal Combustion Engine.
- Design the components under Dynamic Loading.
- Understand the applications of seals & gaskets.
- The different types of failure mode in mechanical components.

BOOKS RECOMMENDED:

- [1]. Shigley J.E., *Mechanical Engineering Design*, McGraw-Hill 2015.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson [3]. Education ,8e,2007.
- [4]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K.Kataria & Sons,11e,2013
- [5]. Bhandari V.B., *Design of Machine Elements*, McGraw-Hill, 4e,2017.
- [6]. Black and Adams, *Machine Design*, Mc.Graw Hill,1968
- [7]. Maleev V.L., *I.C.Engine Design*, , Mc.Graw Hill ,1945

Semester Wise Scheme & Syllabus Of M.E.(PART TIME) Programme

SEMESTER VI

M. E. Computer Engineering With Specialization in Software Engineering

S.No	Subject Code	Subject Name	L-T-P	Credits
1	SEP6D2	DISSERTATION PHASE II	0-0-12	4
2	SEP6V6	COMPREHENSIVE VIVA-VI	0-0-4	4
			TOTAL CREDIT	12(A) + 4(V)

SEMESTER VI**M. E. Information Technology With Specialization in Information Security**

S.No	Subject Code	Subject Name	L-T-P	Credits
1	ISP6D2	DISSERTATION PHASE II	0-0-12	4
2	ISP6V6	COMPREHENSIVE VIVA-VI	0-0-4	4
			TOTAL CREDIT	12(A) + 4(V)

SEMESTER VI**M. E. Electronics Engineering With Specialization in Digital Instrumentation**

S.No	Subject Code	Subject Name	L-T-P	Credits
1	DIP6D2	DISSERTATION PHASE II	0-0-12	4
2	DIP6V6	COMPREHENSIVE VIVA-VI	0-0-4	4
		TOTAL CREDIT		12(A) + 4(V)

SEMESTER VI**M. E. Electronics Engineering With Specialization in Digital Communication**

S.No	Subject Code	Subject Name	L-T-P	Credits
1	DCP6D2	DISSERTATION PHASE II	0-0-12	4
2	DCP6V6	COMPREHENSIVE VIVA-VI	0-0-4	4
			TOTAL CREDIT	12(A) + 4(V)

SEMESTER VI**M. E. Mechanical Engineering Industrial Engineering & Management**

S.No	Subject Code	Subject Name	L-T-P	Credits
1	IMP6D2	DISSERTATION PHASE II	0-0-12	4
2	IMP6V6	COMPREHENSIVE VIVA-VI	0-0-4	4
			TOTAL CREDIT	12(A) + 4(V)

SEMESTER VI**M. E. Mechanical Engineering With Specialization in Thermal & Design Engineering**

S.No	Subject Code	Subject Name	L-T-P	Credits
1	DTP6D2	DISSERTATION PHASE II	0-0-12	4
2	DTP6V6	COMPREHENSIVE VIVA-VI	0-0-4	4
			TOTAL CREDIT	12(A) + 4(V)

Devi Ahilya Vishwavidyalaya, Indore

Institute of Engineering & Technology

Scheme & Syllabus for Ph.D. Course Work (Under the Faculty of Engineering)

(w.e.f. Academic Year 2017-18)

Ph.D. (Computer Engineering)

S No	Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
1	1COR01	Research Methodology	4-0-0	4
2	1COR02	Computer Applications	3-0-0	3
3	1COR03	Review of Published Research	3-0-0	3
4	1COR04x	Advance Course in Computer Engineering	3-0-0	3
5	1COR05	Comprehensive Viva-Voce	0-0-3	3
Total Credits				16
Options available for Advance Course in Computer Engineering				
1	1COR04A	Advance Course in Computer Engineering	3-0-0	3
2	1COR04B	Advance Course in Computer Engineering	3-0-0	3

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Computer Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1COR04A	L	T	P	L	T	P	Total
Advance Course in Computer Engineering	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Computational Complexity: Introduction to research in computational complexity theory. Complexity classes: P, NP, NP-Complete and NP-Hard.

Software Engineering: Advanced theoretical knowledge and technical competences about the topics of current research trends in software Engineering.

Computer Architecture: This course treats a specific advanced topic of current research interest in the area of architecture.

Data Base and Data Mining: Topics involving emerging research trends in the area of Data base and Data mining.

Artificial Intelligence: Topics involving current research in artificial intelligence including its subfields and applications.

RECOMMENDED BOOKS

- [1] T.H. Coreman, C.E. Leiserson and R.L. Rivest, Introduction to Algorithms, Prentice Hall of India, 1990.
- [2] E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
- [3] D. E. Knuth, the Art of Computer Programming, Vol. 1 and 3, (2nd Edition), Addison-Wesley, 1998.
- [4] J.E. Hopcroft, R. Motwani, and J. D. Ullman, Introduction to Automata Theory, Languages and Computation, Pearson Education Asia, 2006.
- [5] Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson, 2015
- [6] David Patterson, John L. Hennessy, Computer Architecture : A Quantitative Approach, 5th Edition, Elsevier India, 2016.
- [7] Kai Hwang, Advanced Computer Architecture, Tata McGraw Hill Education, 2003.
- [8] Kai Hwang, Faye Briggs, Computer Architecture and Parallel Processing, McGraw Hill Education, 1986.
- [9] John L. Hennessy, Computer Organization and Design : Hardware and Software Interface, 5th Edition, Elsevier India, 2012.
- [10] William Stallings, Computer Organization and Architecture: Designing for Performance, PHI, 2012.
- [11] Any other Books, Journals, Conference Proceedings etc. suggested by the respective instructors of the topics.

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Computer Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1COR04B Advance Course in Computer Engineering	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Computational Complexity: Introduction to research in computational complexity theory. Complexity classes: P, NP, NP-Complete and NP-Hard.

Computer Networks: Advanced theoretical knowledge and technical competences about the topics of current research trends in Computer Networks.

Information Security: This course treats a specific advanced topic of current research interest in the area of information security.

Visualization and Image Processing: Topics involving current research in Visualization & Image Processing and applications.

Artificial Intelligence: Topics involving current research in artificial intelligence including its subfields and applications.

RECOMMENDED BOOKS

- [1] T.H. Cormen, C.E. Leiserson and R.L. Rivest, Introduction to Algorithms, Prentice Hall of India, 1990.
- [2] E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
- [3] D. E. Knuth, the Art of Computer Programming, Vol. 1 and 3, (2nd Edition), Addison-Wesley, 1998.
- [4] J.E. Hopcroft, R. Motwani, and J. D. Ullman, Introduction to Automata Theory, Languages and Computation, Pearson Education Asia, 2006.
- [5] Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson, 2015
- [6] Any other Books, Journals, Conference Proceedings etc. suggested by the respective instructors of the topics.

Devi Ahilya Vishwavidyalaya, Indore

Institute of Engineering & Technology

Scheme & Syllabus for Ph.D. Course Work (Under the Faculty of Engineering)

(w.e.f. Academic Year 2017-18)

Ph.D. (Information Technology)

S No	Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
1	1ITR01	Research Methodology	4-0-0	4
2	1ITR02	Computer Applications	3-0-0	3
3	1ITR03	Review of Published Research	3-0-0	3
4	1ITR04	Advance Course in Information Technology	3-0-0	3
5	1ITR05	Comprehensive Viva-Voce	0-0-3	3
Total Credits				16

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Information Technology			
Course Code & Title	Weekly Contact Hours			Credits			
1ITR04	L	T	P	L	T	P	Total
Advance Course in Information Technology	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Security of Blockchain protocols: Study of various Blockchain based protocols and their mechanism, i.e., Bitcoin, Ethereum and other systems.

Automatic Vulnerability Predication and Discovery: Software vulnerabilities, Tools help to find problems, Penetration Testing, Vulnerability scanners.

Secure Remote Authentication: Biometric based, Schemes based on dynamic ID for the multi-server environment, Using Machine learning technique.

Consensus protocols with quantum technologies: To explore consensus protocols, such as Blockchain and Byzantine Agreement, application of quantum technologies in it.

Privacy compliance in big data / distributed / cloud systems: Endpoint input validation/filtering, Scalable and composable privacy-preserving, Secure computation in distributed programming frameworks.

Pervasive security / Security of internet-enabled host devices. Secure booting, access control, device authentication, Tamper Detection techniques and design, Nest thermostats, i.e., Tesla cars and Microsoft's HoloLens.

Establishing Trust in Cloud Computing: Control, Ownership, Security, Remote access, various Certifications.

Cryptocurrency security issues: Transaction and proof of work, the blockchain, and mining, Consensus Protocol, Infrastructure involved.

User-centric privacy technologies and privacy in social media: what are the technologies available and how it is used for social media.

Context-aware security: for Smart spaces, Smartphone, Social networking sites, IOT Devices.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Scheme & Syllabus for Ph.D. Course Work (Under the Faculty of Engineering)

(w.e.f. Academic Year 2017-18)

Ph.D. (Electronics & Instrumentation Engineering)

S No	Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
1	1EIR01	Research Methodology	4-0-0	4
2	1EIR02	Computer Applications	3-0-0	3
3	1EIR03	Review of Published Research	3-0-0	3
4	1EIR04x	Advance Course in Electronics & Instrumentation Engineering	3-0-0	3
5	1EIR05	Comprehensive Viva-Voce	0-0-3	3
Total Credits				16
Options available for Advance Course in Electronics & Instrumentation Engineering				
1	1EIR04A	VLSI System Design	3-0-0	3
2	1EIR04B	Advanced Communication System	3-0-0	3

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Electronics & Instrumentation Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1EIR04A VLSI System Design	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Unit I: Digital system Design, Basics and vulnerabilities, Design intellectual property protection, Physical attack and Modular Exponentiations, Side channel attacks and countermeasures, Hardware Trojen Detection, and Trusted IC design, Good Practice and emerging technologies.

Unit II: Challenges in Digital IC design, CMOS Inverters, Components of Energy and Power, Switching, Short circuit and leakage components, Leakage power Dissipation, SPICE Simulation, Logical Effort sizing- Performance Optimization of Digital Circuits, Memory, SRAM cell design, Differential sense amplifier, Self timing, DRAM design, Single Ended sense Amplifier, CMOS scaling, Power reduction through switching activity reduction.

Unit III: Analog signal processing , CMOS digital to analog convertor, Scaling and serials, cyclic, Analog to digital convertors, Serial,SAR, Prallel, pipelined,sigma-delta convertors, mixed signal Layout issues, Continuous time filters, Switched capacitor filters, Modulators and multipliers, PLL.

Unit IV: Introduction to Verilog, Module, delays, description language elements, Expressions, Gate level modeling, User defined primitives, Dataflow modeling, Behavioral modeling, Structural modeling,Task and functions.

Unit V: Tutorial on CADENCE Design tools – Layout of a CMOS Gate, Extraction, SPICE, LS, Tutorial on Xilinx Design tool- Digital Syatem design on FPGA with security and BIST.

BOOKS RECOMMENDED

- [1]. Sung-mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuit analysis and Design, Tata McGraw-Hill, 3/e.
- [2]. R. Jacob Baker, Harry W. Li and David E. Boyce, CMOS Circuit design, layout and Simulation, PHI,IEEE press, Series Edition,
- [3]. Yuan Taur and Tak H. Ning, Fundamentals of Modern VLSI Devices, Cambridge university Press, Special Edition, 1998
- [4]. Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, PHI, 2/e
- [5]. Jan M. Rabaey, Digital Integrated Circuit, PHI, 2/e
- [6]. Samir Palnitkar, Verilog-HDL, Pearson Education, 2/e.

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Electronics & Instrumentation Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1EIR04B Advanced Communication System	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Unit I - A brief overview of Transceiver techniques used in advanced communication systems: Modulation and demodulation formats, Spread spectrum modulation, Speech coding, Channel coding, Modulation and coding trade-offs, Multiple Access Techniques.

Unit-2 Statistical description of wireless channels: Propagation mechanisms, large scale fading & Small scale fading, Fading channel parameters, channel models – Tapped delay line models, Path loss models. Fading mitigation techniques – Multiple Antenna systems & space Diversity, OFDM, Equalization.

Unit-3 Standard Communication Networks: GSM, CDMA, WCDMA/UMTS, LTE their Architecture and working, Principles of 5G mobile systems, WLAN, WiMax. Concepts of Relaying, Multi-hop and co-operative communication, Cognitive Radio.

Unit-4 Optical Networks: Basics of optical network, WDM Optical network architectures and design issues, routing, wavelength/spectrum allocation, survivability, Fiber Wireless Access Networks, Elastic optical networks.

Unit-5 Methodology for simulating a communication system: Modelling and simulation of time-varying channels, Simulation of discrete channel models. Case Studies on Simulation of communication systems.

BOOKS RECOMMENDED:

- [1]. A F Molisch, Wireless communication, Second Edition, Wiley Publication, 2014.
- [2]. I S Misra, Wireless Communication and Networks 3G and beyond, Second Edition, MGH Publication, 2013.
- [3]. D Tse & P Viswanath, Fundamentals of Wireless Communication, Cambridge, 2010.
- [4]. B Skalar, Digital Communication, Second Edition, P Hall Publication,
- [5]. M Mayer, Optical Switching Networks, first edition, 2014.
- [6]. W Tranter, K S Shanmugan, T S Rappaport, K L Kosbar, Principles of Communication Systems Simulation, Pearson education, 2004.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Scheme & Syllabus for Ph.D. Course Work (Under the Faculty of Engineering)
(w.e.f. Academic Year 2017-18)

Ph.D. (Electronics & Telecommunication Engineering)

S No	Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
1	1ETR01	Research Methodology	4-0-0	4
2	1ETR02	Computer Applications	3-0-0	3
3	1ETR03	Review of Published Research	3-0-0	3
4	1ETR04x	Advance Course in Electronics & Telecommunication Engineering	3-0-0	3
5	1ETR05	Comprehensive Viva-Voce	0-0-3	3
Total Credits				16
Options available for Advance Course in Electronics & Telecommunication Engineering				
1	1ETR04A	VLSI System Design	3-0-0	3
2	1ETR04B	Advanced Communication System	3-0-0	3

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Electronics & Telecommunication Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1ETR04A VLSI System Design	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Unit I: Digital system Design, Basics and vulnerabilities, Design intellectual property protection, Physical attack and Modular Exponentiations, Side channel attacks and countermeasures, Hardware Trojan Detection, and Trusted IC design, Good Practice and emerging technologies.

Unit II: Challenges in Digital IC design, CMOS Inverters, Components of Energy and Power, Switching, Short circuit and leakage components, Leakage power Dissipation, SPICE Simulation, Logical Effort sizing- Performance Optimization of Digital Circuits, Memory, SRAM cell design, Differential sense amplifier, Self timing, DRAM design, Single Ended sense Amplifier, CMOS scaling, Power reduction through switching activity reduction.

Unit III: Analog signal processing , CMOS digital to analog convertor, Scaling and serials, cyclic, Analog to digital convertors, Serial,SAR, Prallel, pipelined,sigma-delta convertors, mixed signal Layout issues, Continuous time filters, Switched capacitor filters, Modulators and multipliers, PLL.

Unit IV: Introduction to Verilog, Module, delays, description language elements, Expressions, Gate level modeling, User defined primitives, Dataflow modeling, Behavioral modeling, Structural modeling,Task and functions.

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- [3]. Yuan Taur and Tak H. Ning, Fundamentals of Modern VLSI Devices, Cambridge university Press, Special Edition, 1998
- [4]. Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, PHI, 2/e
- [5]. Jan M. Rabaey, Digital Integrated Circuit, PHI, 2/e
- [6]. Samir Palnitkar, Verilog-HDL, Pearson Education, 2/e.

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Electronics & Telecommunication Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1ETR04B Advanced Communication System	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Unit I - A brief overview of Transceiver techniques used in advanced communication systems: Modulation and demodulation formats, Spread spectrum modulation, Speech coding, Channel coding, Modulation and coding trade-offs, Multiple Access Techniques.

Unit-2 Statistical description of wireless channels: Propagation mechanisms, large scale fading & Small scale fading, Fading channel parameters, channel models – Tapped delay line models, Path loss models. Fading mitigation techniques – Multiple Antenna systems & space Diversity, OFDM, Equalization.

Unit-3 Standard Communication Networks: GSM, CDMA, WCDMA/UMTS, LTE their Architecture and working, Principles of 5G mobile systems, WLAN, WiMax. Concepts of Relaying, Multi-hop and co-operative communication, Cognitive Radio.

Unit-4 Optical Networks: Basics of optical network, WDM Optical network architectures and design issues, routing, wavelength/spectrum allocation, survivability, Fiber Wireless Access Networks, Elastic optical networks.

Unit-5 Methodology for simulating a communication system: Modelling and simulation of time-varying channels, Simulation of discrete channel models. Case Studies on Simulation of communication systems.

BOOKS RECOMMENDED:

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- [2]. I S Misra, Wireless Communication and Networks 3G and beyond, Second Edition, MGH Publication, 2013.
- [3]. D Tse & P Viswanath, Fundamentals of Wireless Communication, Cambridge, 2010.
- [4]. B Skalar, Digital Communication, Second Edition, P Hall Publication,
- [5]. M Mayer, Optical Switching Networks, first edition, 2014.
- [6]. W Tranter, K S Shanmugan, T S Rappaport, K L Kosbar, Principles of Communication Systems Simulation, Pearson education, 2004.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Scheme & Syllabus for Ph.D. Course Work (Under the Faculty of Engineering)

(w.e.f. Academic Year 2017-18)

Ph.D. (Mechanical Engineering)

S No	Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
1	1MER01	Research Methodology	4-0-0	4
2	1MER02	Computer Applications	3-0-0	3
3	1MER03	Review of Published Research	3-0-0	3
4	1MER04x	Advance Course in Mechanical Engineering	3-0-0	3
5	1MER05	Comprehensive Viva-Voce	0-0-3	3
Total Credits				16
Options available for Advance Course in Mechanical Engineering				
1	1MER04A	Design Engineering	3-0-0	3
2	1MER04B	Thermal Engineering	3-0-0	3
3	1MER04C	Industrial Engineering & Management	3-0-0	3

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Mechanical Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1MER04A Design Engineering	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	0	0	3	0	0	3

COURSE CONTENTS

Elastohydrodynamic Lubrication:

Introduction, General Iterative Procedure, Fundamental Parameters, Normal approach, Relative Sliding, Pressure spike, Elastohydrodynamics Number, Macro Elastohydrodynamics, Elastohydrodynamics and hysteresis.

Noise Measurement & Control Procedure:

Introduction, Objective and Subjective noise measurement, frequency analysis bandwidth, free field techniques, reverberant field techniques, semi reverberant field techniques, basic industrial noise control methods, economic factor, acoustic enclosures and barriers, sound absorbing materials.

Vibration Analysis of Multi degree-of-Freedom Systems:

Introduction, Modal Analysis , Applications of Modal Analysis, Modal Testing, introduction to Excitation and Response Sensors, Modeling and Modal Analysis of Multi degree-of-freedom Systems , Vibration Analysis of gears and bearings.

RECOMMENDED BOOKS

- [1] S. S. Rao, *Mechanical Vibrations*, Pearson Education., 2011.
- [2] Ambekar A. G., *Mechanical Vibrations and Noise Engineering* , Prentice Hall of India Pvt. Ltd.,2010
- [3] Thomson, W.T., *Theory of Vibration with Applications*. Pearson Education,2011.
- [4] Rao J S & Gupta K. *Introductory Course on Theory and Practice of Mechanical Vibration* ,New Age Publisher, New Delhi, 2e, 2002

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Mechanical Engineering			
Course Code & Title	Weekly Contact Hours			Credits			
1MER04B Thermal Engineering	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Advanced Thermodynamic Analysis of Heat Exchangers:

Classification of Heat Exchangers, LMTD and NTU approach for determining the effectiveness, Heat Exchanger efficiency, Heat exchanger analogy number, Entropy generation rate for heat exchangers, Expression for entropy generation rate for the balanced type heat exchangers, relationship between efficiency and effectiveness of heat exchangers, Thermodynamic design of shell and tube type heat exchangers using efficiency approach..

Advanced Vapour Absorption and other Technologies

Vapor Absorption Systems: Ammonia-Water, Three fluid, Water-Lithium bromide; Solar-Powered Absorption Refrigeration System, Multi Stage Absorption Systems, Energy and Exergy analyses of Vapour Absorption Systems Single Stage System; Multistage Refrigeration: Two-stage with given Intermediate Pressure, Optimum Interstage Pressure Load Estimation, Air-conditioning Systems: Classification-All Air, Air and water, All water Systems; Decentralized Cooling and Heating; Individual systems; Evaporative; Dessicant; Thermal storage; Clean room; Space systems; Packaged; Central systems .

Thermodynamic Analysis of Air standard cycles

Thermodynamic design of endoreversible and irreversible air standard cycles under maximum power, maximum power density and maximum efficient power, ecological optimization of thermodynamic cycles, thermal efficiencies under maximum power output and maximum power density, Second law efficiency determination.

RECOMMENDED BOOKS

1. W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 4e, 1985
2. Prasad M, *Refrigeration and Air conditioning*, New Age International, 2e, 2011
3. Arora C P *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
4. W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
5. Shan Wang, *Handbook of Air-Conditioning and Refrigeration*, McGraw-Hill Book Company, 2e, 2000
6. McQuiston F C., Parker J.D. and Spitler J. D., *Heating, Ventilating, and Air-Conditioning Analysis and Design*, John Wiley & Sons, 6e, 2005

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology			Ph.D. Course Work in Mechanical Engineering				
Course Code & Title	Weekly Contact Hours			Credits			
1MER04C Industrial Engineering & Management	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Diagnosing a Process:

Introduction, diagnostic tools & techniques like Brainstorming, Affinity Diagram, Cause & Effect Diagram, Interrelationship Digraph, Pareto Analysis, Systematic Diagram, Matrix Diagram, Program Decision Process Chart(PDPC) Analysis, Gantt Chart, Change Concepts, Design of Experiments.

Advanced Research Techniques In Quality Management:

Analytical Hierarchy Process (AHP), Quality Function Deployment (QFD), Green Quality Function Deployment (GQFD), Analytical Network Process (ANP), Models of Total Quality Management Implementation, Fork Model for Quality Management, Interpretive Structure Modelling (ISM).

Advanced Research Techniques In Supply Chain And Operations Management:

Supply Chain Concepts, Designing of Supply Chain network, Performance Measurement of Supply Chain, Supply Chain drivers. Concept of Lean Manufacturing & different tools of it. Overview of synchronous manufacturing, WCM overview, JIT purchasing, KANBAN, KAIZEN concepts, modern trends in operations management.

RECOMMENDED BOOKS

1. 'Operations Management(2006)' by Richard B Chase, Nicholas J Aquilano, The McGraw- Hill companies, 11e.
2. 'Quality Management (2009)' by Howard S Gitlow, Alan J Oppenheim, McGraw- Hill companies, 3e.
3. 'Supply Chain Management: Strategy, Planning & Operation' (2010) by Sunil Chopra, Peter Meindel, Pearson Education, 4e

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Scheme & Syllabus for Ph.D. Course Work (Under the Faculty of Engineering)

(w.e.f. Academic Year 2017-18)

Ph.D. (Applied Mathematics)

S No	Course Code	Course Title	Weekly Contact Hours (L-T-P)	Credits
1	1AMR01	Research Methodology	4-0-0	4
2	1AMR02	Computer Applications	3-0-0	3
3	1AMR03	Review of Published Research	3-0-0	3
4	1AMR04	Advance Course in Applied Mathematics	3-0-0	3
5	1AMR05	Comprehensive Viva-Voce	0-0-3	3
Total Credits				16

Devi Ahilya Vishwavidyalaya, Indore Institute of Engineering & Technology				Ph.D. Course Work in Applied Mathematics			
Course Code & Title	Weekly Contact Hours			Credits			
1AMR04 Advance Course in Applied Mathematics	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Correlation and Regression Analysis: Linear correlation and regression, Multiple correlation and regression and Partial correlation and regression.

Mathematical Modelling: Concept of Models, Classification of models, Meaning and formulation of Mathematical models, Mathematical modelling through Differential Equations and Difference Equations.

Operations Research: Introduction to LPP and its subclass, Integer LPP, Sensitivity Analysis. Inventory problems and their Analytical structure. Classification of Queues, Queuing models and its Applications. Introduction to Non – Linear Programming, Dynamic Programming and Geometric Programming.

Fixed Point Theory: Fixed Point, Banach Contraction Principle and its Applications, Brouwer's Fixed point theorem and its Application, Schauder's fixed point theorem and related results.

Graph Theory: Introduction, Connectedness, Euler and Hamilton graphs, Matching, Covering and Coloring of graphs, shortest path problem, Minimum Spanning tree algorithms and their applications, Ford-Fulkerson algorithm, Max. flow Min. Cut method, Graph Labeling.

Fuzzy Optimization: Classical (Crisp) Sets, Fuzzy Sets: Basic Concepts and Properties, Fuzzy Arithmetic, Fuzzy Relations, Fuzzy Functions, Fuzzy Graph, Fuzzification and Defuzzification, Possibility theory, Approximate Reasoning, Fuzzy Logic, Fuzzy Inference, Fuzzy Controllers and their applications.

RECOMMENDED BOOKS

1. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.
2. Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
3. A. P. Baisnab and M. Jas, Elements of Probability and Statistics, Tata McGraw-Hills Publishing Company Ltd. New Delhi.
4. J.N. Kapur, Mathematical Modelling, Wiley Eastern Limited, New Delhi, 1988.

5. Zafar Ahsan, Differential Equations and their Application, Prentice-Hall of India Pvt.Ltd., New Delhi, 2004.
6. Introduction to Mathematical Modelling, Edward A. Bender, Dover Publications Inc., New York, USA.
7. Hillier, F. S., Lieberman, G. J. – Introduction to Operation Research, 8th Ed., New York, McGraw- Hill, 2005.
8. Taha, H. A. – Operations Research: An Introduction, 7th ed., Macmillan Publication Co., 2003.
9. P. K. Gupta and D. S. Hira, Operations Research, S. Chand., 2008.
10. H.K. Pathak and Pradeep K Joshi, Operations Research, Shiksha Sahitya Prakashan, 2nd Edition, 2015.
11. George F. Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Company Inc., 1963.
12. Walter Rudin, Functional Analysis, McGraw-Hill Publishing Co., 1973.
13. H.K. Pathak, Functional Analysis with applications, Shiksha Sahitya Prakashan, 3rd Ed., 2013.
14. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Ed. 2007.
15. C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
16. Graph Theory With Applications to Engineering and Computer Science, Narsingh Deo, Phi Learning,
17. Graph Theory, F. Harary, Narosa Publishing House, 5th Ed., 2001.
18. G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
19. H.J. Zimmermann, Fuzzy Set Theory and its Applications, Allied Publishers, New Delhi, 1991.
20. Kwang Hyung Lee, First Course on Fuzzy Theory and Applications, Springer, 2005.
21. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley Publication, 2010.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 29/05/2018

Department heads presented the syllabus and scheme of 7th Sem. Committee has approved the syllabus and scheme of 7th Sem, after thorough discussion, for following branches of BE;

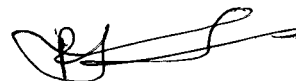
- Mechanical Engineering
- Computer Engineering
- Electronics & Instrumentation Engineering
- Information Technology
- Electronics & Telecommunication Engineering
- Civil Engineering



Dr. Paresh Atri



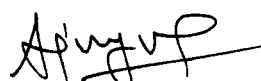
Dr. G. L. Prajapati



Dr. Ravi Sindal



Dr. S. Prakash



Dr. A. Verma



Dr. Mrs. V. Tokekar

S.V. Tokekar
29-05-18

Dr. S. Tokekar

Scheme & Syllabus For B.E Programme (Full Time)

B. E. IV YEAR MECHANICAL ENGINEERING DEPARTMENT
(CBCS) L -Lecture, T – Tutorial, P – Practical, PC-Programme core, PE-Programme
Elective, CBCS-Choice based credit system

Semester-VII

S.No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1	MER7C1	OPERATIONS RESEARCH	PC	3-1-0	4
2	MER7C2	MACHINE DESIGN - III	PC	3-1-1	4+1(P)
3	MER7C3	REFRIGERATION & AIR CONDITIONING	PC	3-1-1	4+1(P)
4	MER7EX	--	PE	3-1-1	4+1(P)
5	MER7P1	PROJECT PHASE - I		0-0-7	7(P)
6	MER7V7	COMPREHENSIVE VIVA -VII	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

List of Elective – I

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1.	MER7E1	SQC & TQM	PE	3-1-1	4+1(P)
2.	MER7E2	Artificial Intelligence	PE	3-1-1	4+1(P)
3.	MER7E3	Robotics	PE	3-1-1	4+1(P)
4.	MER7E4	Tribology	PE	3-1-1	4+1(P)
5.	MER7E5	Computational Fluid Dynamics	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER7C1 OPERATIONS RESEARCH	3	1	0	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming.
- To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like Transportation, Assignment, and Queuing etc.
- To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like Strategies formulation with the help of game theory and simulation etc.

Pre requisite(s): Industrial Engineering & Management and Materials Management.

COURSE CONTENTS

UNIT- I

INTRODUCTION: History and development Operations Research, Scientific Methods, Characteristics, Scope, Models in Operations Research. Linear Programming: Formulation, graphical methods, simplex method, Big- M- method

UNIT- II

TRANSPORTATION & ASSIGNMENT MODELS: Definition, Mathematical Representation, Formulation and Solution, Alternate optimal solution Transportation Model: Definition, Formulation and solution, Alternate optimal solution, Stepping stone method, Modified distribution (MODI) or u-v method. Traveling salesman problem, and minimal path problem.

UNIT- III

WAITING LINE MODELS: Introduction, classification, state in queue, probability distribution of arrival and service times. Single server model (M/M/I). Multiple server model (MMS). Birth & death process. Dynamic Programming: Introduction, Distribution characteristic, Dynamic programming approach, Optimal subdivision problem.

UNIT- IV

GAME THEORY & SIMULATION: Theory of Game, Competitive game, Two persons, zero sum games, maximin and minimax Principles. Saddle point. Method of Dominance, graphical and algebraic method of solution by transforming into linear programming problem. Bidding problem. Building a simulation model, Monte-Carlo simulation and application.

UNIT- V

NETWORK ANALYSIS: Network diagram, Time estimation, Basic steps in PERT and CPM, PERT computation, CPM computation, critical path, Float, Cost analysis, Crashing of activities in the network

Learning Outcomes:

- Students will be able to apply linear programming models in different practical situations.
- Students will be able to optimize the resources different conditions.
- Students will be able to know the various situation for queuing in service and industrial situations.
- Students will be able to know the various strategies required in business decisions using game theory.
- Students will be able to know the project implementation and control techniques using network analysis.

BOOKS RECOMMENDED:

- Taha, *Operations Research*, Tata Mc.Graw Hill.
- Wagner, *Operations Research*, PHI. New Delhi, 2003.
- Ravindram & Philips, *Operations Research*, Tata Mc.Graw Hill.
- Gupta & Hira, *Operations Research*, S. Chand. 1e, 2008
- Chitle & Negi, *Operations Research*, Jain Brothers.
- Vohra N.D, Kataria S.K, *Quantitative Techniques for Management*. Tata Mc.Graw Hill, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7C2	L	T	P	L	T	P	Total
Machine Design III	3	1	2	3	1	1	5
Duration of Theory Paper: 4 Hours							

Learning Objectives:

- The objective of the subject to introduce the students about the new and advanced methods of design like optimization in design.
- The objective of the subject to introduce the students about the new and advanced methods of design like reliability based design,
- The objective of the subject to introduce the students about the new and advanced methods of design like high temperature resistance part design etc.
- The objective of the subject to introduce the students about design of Journal Bearing and selection of Anti frictional Bearings from manufacturing catalogues.

Pre requisite(s): Machine Design I, Machine Design II.

COURSE CONTENTS

UNIT-I

Design for Bearings: Introduction about different types of bearings, Design for Journal bearing: Specifying bearing modulus, minimum oil film thickness, flow of oil, bearing heat balancing. Elementary treatment of contact stress, Selection of antifriction bearings.

UNIT-II

Reliability and Optimum based Design: Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability, System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

UNIT-III

Design for Tool Drive: Design of machine tool drives such as lathe, drilling and milling machine, speed diagram, ray diagram, preferred number.

UNIT-IV

Design for Creep: Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

UNIT-V

Design for Un-symmetrical Bending: Design of parts of unsymmetrical sections, shear center, parts subjected to unsymmetrical bending.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Learning Outcomes:

Upon completing the course, student will be able to:

- Design the machine components on the basis of Reliability.
- Optimize the mechanical component design.
- Design the component under high temperature condition.
- Determine the arrangement and layout for tool drive design.
- Evaluate and Design the Unsymmetrical component subjected to loading condition.

BOOKS RECOMMENDED:

- Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill ,4e,2003.
- Spotts M.F.,Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006.
- Sharma P.C. and Aggarwal D.K., *Machine Design*,S.K.Kataria & Sons,11e,2006.
- Shariff A.,*Design of Machine Elements*,Dhanpat Rai Publications(P) Ltd.,3e,1995.
- Maleev V.L., *I.C.Engine Design*, , Mc.Graw Hill ,1e,1945.
- Black and Adams, *Machine Design*, Mc.Graw Hill, 2e, 1968.
- Mubeen A., *Machine Design*, Khanna Publishers, 4e, 2005.

LIST OF PRACTICAL ASSIGNMENTS

- Problem on Design of Journal Bearing.
- Problem on selection of Antifriction Bearing.
- Problem on Reliability based design.
- Problem on Dimensioning of parts.
- Problem on Optimum based design.
- Problem on Design for Tool Drive.
- Problem on Design for creep.
- Problem on Design for Un-symmetrical Bending.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7C3	L	T	P	L	T	P	Total
REFRIGERATION AND AIR-CONDITIONING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Realize the importance of science of Refrigeration and Air-Conditioning.
- Understand the different Refrigeration and Air-Conditioning systems.
- Able to apply the learning outcomes of prerequisites for design and selection of Refrigeration and Air-Conditioning systems for specific applications.
- Learn latest trends in Refrigeration and Air-Conditioning.

Prerequisite(s): Applied Mathematics I/II/III/IV, Engineering Thermodynamics, Fluid Mechanics, Thermal Engineering, Heat Transfer.

COURSE CONTENTS

UNIT -I

Introduction and Air Refrigeration Systems: Introduction: Review of reversed Carnot Cycle, Coefficient of Performance, Types of Refrigeration Systems, Bell-Coleman cycle, Air-Refrigeration Cycles, systems for aircraft, Boot-strap type and simple evaporative systems, Applications of refrigeration systems

UNIT -II

Vapour Compression Refrigeration (VCR) Systems: Thermodynamic Cycle, T-s and P-h diagrams, Components and types: Compressor, Condenser, Expansion device and Evaporator, Analysis, effect of under-cooling and suction superheat, Limitations of VCR systems; Refrigerants: Classification, Properties and nomenclature, primary and secondary refrigerants, eco-friendly Refrigerants.

UNIT-III

Unconventional Refrigeration Systems and Future Trends: Vapor Absorption Systems: absorption cycle, Lithium-bromide system, heat-exchangers, analyzer and diffusers; The Electrolux system; Steam-Jet Refrigeration, Thermo-Electric Refrigeration. Low-temperature refrigeration: Cascade systems, Joule-Thompson effect, liquefaction of gases, application areas.

UNIT -IV

Psychrometry and Load Estimation: Psychrometry: Psychrometers, Terminology, Psychrometric Chart, Psychrometric properties and Processes, Apparatus Dew Point (ADP), By-pass factor; Thermal Comfort: metabolism and heat exchange by the human body, comfort charts, Current ASHRAE Standards; Air-conditioning Load Estimation: Heat Transfer fundamentals; Cooling and

heating load estimation, Heat transfer across the building envelope, thermal insulation; Solar Heat Gain, ventilation and infiltration. Sensible heat factors: Room Sensible Heat Gain Factor (RSHF), Grand Sensible Heat Gain Factor (GSHF) Effective Room Sensible Heat Gain Factor (ERSHF) lines

UNIT -V:

Air Conditioning Systems: Air conditioning Systems: Basic Components, Types and selection, Air Systems, Water Systems, Room Air Conditioners – Window Type, Package Type, Split Type, Central Units. Air Supply Systems: Fans and Blowers, performance characteristics, heating and cooling coils, Flow through Ducts, Losses, Duct Design Methods. Air Distribution and control Devices.

Note: Refrigerant tables, Refrigeration and Air-conditioning Data Book and certified data tables are allowed in the examination hall.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the design and working principles of Refrigeration and Air-Conditioning systems.
- Select Refrigeration and Air-Conditioning system components.
- Learn advance subjects of Refrigeration and Air-Conditioning .
- Industry ready for Refrigeration and Air-Conditioning industry.

BOOKS RECOMMENDED

- Stoeker and Jones, Refrigeration and Air-conditioning, McGraw-Hill Co, 2008.
- Arora C.P., Refrigeration and Air-conditioning, TataMcGraw Hill, 2008.
- Prasad M, Refrigeration and Air-conditioning. New Age Publishers, 9e, 2008.
- Ameen Ahmadul, Refrigeration and AirConditioning, Prentice-Hall of India, 2006.
- Arora R. C., Refrigeration and Air-conditioning, TataMcGraw Hill, 2008.

LIST OF PRACTICAL ASSIGNMENT

- To find the coefficient of performance of Vapour compression Refrigeration (VCR) system.
 - To find the Refrigeration effect of Vapor compression Refrigeration (VCR) system.
 - To find coefficient of performance of Air-conditioner Trainer system.
 - To find Refrigeration effect of Air-conditioner Trainer system.
 - To find various psychometric properties of Air.
 - To find the Refrigeration effect of Vapor Absorption Refrigeration (VAR) system.
 - Estimate cooling load of a building envelop.
 - To prove the relation between the coefficient of performance of a Heat Pump and a Refrigerator.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E1	L	T	P	L	T	P	Total
SQC & TQM	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The objective of the subject to introduce concepts of quality & quality control.
- To impart the knowledge of Total Quality Management philosophy this is widely adopted by the business organizations now a day.
- This course will enable the students to apply the concepts of Quality in the industries & get benefited.

Pre requisite(s): Industrial Engineering & Management & Materials Management.

COURSE CONTENTS

UNIT- I

BASIC CONCEPTS OF QUALITY: Meaning of Quality, Quality of Design, Quality of Conformance, quality of performance, Quality characteristic, Quality functions, Costs of Quality, Value of Quality, Quality control, Quality Control and inspection, Quality Policy, Objectives and organization, Quality Assurance. Statistical concept, Frequency distributions.

UNIT- II

STATISTICAL QUALITY CONTROL: Concepts of Variations Process capability, variables and attributes, Theory of Control chart, Control chart for variable-x bar & R chart, Application of control chart for variables. Patterns of control charts. Control Chart for Attributes: **P, np, C** and demerit control charts & their application.

UNIT- III

ACCEPTANCE SAMPLING: Fundamental concepts, OC Curve-construction of OC curve, Evaluation of parameters affecting OC curve, sampling plans: Single, Double, Multiple & Sequential sampling plans. Selection of sampling plan.

UNIT- IV

TOTAL QUALITY MANAGEMENT: Introduction to TQM :- Feature of TQM System, Application & Benefits of TQM. Objective of TQM, Scope & Approach of TQM, Key Activity Areas of TQM, Principles of TQM, Total Quality management philosophy of Deming, Juran & Philip Crossby. TQM Models – Models for TQM Implementations, Strategic tools & techniques of TQM.

UNIT- V

RELIABILITY & ISO 9000: Basic Concept of reliability, Reliability and Quality, failures and failures modes, Causes of failure and unreliability, Maintainability and availability. System

reliability models- System with components in series. Systems with parallel components. Need for Quality system, History of ISO: 9000 series of standards, features of ISO: 9000 series of standards.

Learning Outcomes:

Upon completing the course, student will be able to:

- Understand the concept of Quality and basic statistical concepts.
- Preparation of Process control chart in the different industrial process.
- Understand the concepts of Acceptance Sampling.
- Apply the basics of Total Quality Management and its implementation.
- know the system reliability concept and ISO standards.

BOOKS RECOMMENDED:

- Kapur K.C. & Lamberson, *Reliability in Engg. Design*, Wiley Eastern.
- Grant E.L. & Leave Worth, *Statistical Quality Control*, Tata Macgrawhill.
- Juran and Gryan, *Quality Planning Analysis*, Tata Macgrawhill.
- Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons(P)Ltd, 3e, 2003.
- Sharma D. D., *Toatal Quality Management*, Sultan Chand & Sons, 2e,2004.
- Besterfield, *Toatal Quality Management*, Pearson Education, 3e,2005.

LIST OF PRACTICAL ASSIGNMENTS

- Study and Analysis of set parameters relating to different mathematical distributions(Variable).
 - Study and Analysis of set parameters relating to different mathematical distributions (Discrete).
 - Construction & analysis of various process control charts.
 - Performance of Acceptance Sampling for a given set of lots.
 - Analysis of tools of related to total Quality Management like QFD, Fish bone diagram etc.
 - Case studies related to Quality Problems.
 - Case studies related to Quality Control.
 - Case studies related to Quality Management.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E2	L	T	P	L	T	P	Total
Artificial Intelligence	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The main objective of the subject is to introduce the students about the problems and techniques of AI.
- The course content provides the theoretical aspects of AI and explore the ways that the current AI techniques can be used.
- The objective of the subject to introduce the students about the Expert Systems and Machine Learning.
- The objective of the subject to introduce the students about the fuzzy logic systems, Crisp sets and fuzzy sets.

Pre requisite(s): Data structures, Computer Programming, Applied Mathematics I, II, III & IV.

COURSE CONTENTS

UNIT-I

Introduction to Artificial Intelligence: Introduction and history of AI, Human intelligence versus artificial intelligence, Task domains of AI, Representations in AI, Introduction to AI techniques, Limitations of AI. Defining the AI problem as state space search, Problem characteristics and search techniques: Heuristic search techniques. Problem reduction and constraint satisfaction.

UNIT-II

Knowledge Representation: Introduction and need for a good representation, Ways of representing knowledge, Syntactic and semantic systems, Predicate logic, Production rules, Nonmonotonic systems, Statistical reasoning systems, Semantic nets, Frames, Conceptual dependency and Scripts. Problem solving: Inference and Resolution.

UNIT-III

Expert Systems and Machine Learning: Introduction, Rule based expert systems, Knowledge acquisition and Knowledge bases, Architecture of an expert system, Introduction to CLIPS (C Language Integrated Production System), Introduction to techniques for machine learning, Version spaces and Nearest Neighbour Algorithm, Introduction to machine vision.

UNIT-IV

Neural Networks and Fuzzy Logic Systems: Introduction, Supervised learning and Unsupervised learning, Neurons, Perceptrons, Multilayer neural networks, Recurrent networks, Unsupervised learning networks, Learning in Neural Networks and applications of neural networks. Introduction to fuzzy logic systems, Crisp sets and fuzzy sets, fuzzy logic control, Neuro fuzzy systems.

UNIT-V

Planning and Language Processing: Overview of planning and components of planning systems, Planning methods, Introduction to Natural language processing: Syntactic processing and

Semantic analysis, Ambiguity and pragmatic analysis, Overview of programming languages of AI like LISP/PROLOG. Implementations of AI based applications in LISP/PROLOG.

Learning Outcomes:

Upon completing the course, student will be able to:

- Familiar with the history, concept of Artificial Intelligence.
- Familiar with Expert Systems and Machine Learning processes.
- Understand, analyse and solve problems in the fuzzy logic systems, Crisp sets and fuzzy sets.

BOOKS RECOMMENDED:

- Rich Elaine, Knight Kevin, Nair Shivashankar B., *Artificial Intelligence*, McGraw-Hill ,3e,2009.
- Coppin Ben, *Artificial Intelligence Illuminated*, Narosa Publishing House ,2005
- Charniak Eugene, McDermott Drew, *Introduction to Artificial Intelligence*, Pearson Education,2e,2007
- Russell Stuart, Norvig Peter, *Artificial Intelligence A Modern Approach*, Pearson Education,2e,2007
- Winston Patric Henry, *Artificial Intelligence* , Pearson Education Asia ,3e,2000.

LIST OF PRACTICAL ASSIGNMENTS

- Write a program to solve 8 queens problem.
- Solve any problem using depth first search.
- Solve any problem using best first search.
- Solve 8-puzzle problem using best first search.
- Solve Robot (traversal) problem using means End Analysis.
- Solve traveling salesman problem.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E3	L	T	P	L	T	P	Total
ROBOTICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The main objective of the subject to introduce the students about the new and advanced methods to implement on design of Industrial robot.
- Objective of the subject to introduce the students about the new and advanced methods to implement on Industry Automation.
- Students will demonstrate an understanding of how to program robots and computers that control manufacturing automation.

Pre requisite(s): Theory of Machine, Dynamics of Machine.

COURSE CONTENTS

UNIT-I

Introduction: Automation and Robotics, CAD/CAM and Robotics, An over view of Robotics, Present and future applications, Classification by coordinate system and control system.

UNIT-II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom, Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-III

Robot Arm Kinematics: Direct and inverse kinematics, Rotation matrices, Composite rotation matrices, Euler angle representation , Homogenous transformation, Denavit Hattenberg representation and various arm configuration.

UNIT-IV

Robot Arm Dynamics: Lagrange – Euler formulation, joint velocities, Kinetic energy, Potential energy and motion equations, Generalised D'Alembert equations of motion.

UNIT-V

Application of Robotics: Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading- Processing, Spot and continuous arc welding & spray painting, Assembly and Inspection.

Learning Outcomes:

- Familiar with the history, concept development and key components of robotics technologies.
- Familiar with various robot sensors and their perception principles that enable a robot to analyse their environment, reason and take appropriate actions toward the given goal.
- Understand, analyse and solve problems in spatial coordinate representation and spatial transformation, robot locomotion design, kinematics, motion control.

BOOKS RECOMMENDED:

- Fu K. S., *Robotics (Control, Sensing, Vision and Intelligence)*, McGraw-Hill, 4e, 2003.
- Schilling R.J., *Fundamental of Robotics*, Prentice Hall, 1990.
- Wesley, Sryda E., *Industrial Robots: Computer interfacing and Control*, Prentice Hall, 1985.
- Groover M.P., *Industrial Robotics Technology Programming and Applications*, McGraw-Hill, 1986.
- Asada and Slotine, *Robot Analysis and Control*, John Wiley and Sons, 1986.

LIST OF PRACTICAL ASSIGNMENTS

- Assignment on introduction to robot configuration.
 - Demonstration of robot with 2 DOF, 3 DOF, 4 DOF etc.
 - Two assignments on programming the robot for applications.
 - Two assignments on programming the robot for applications in VAL II.
 - Two programming exercises for robots.
 - Two case studies of applications in industry.
 - Exercise on robotic simulation software.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E4	L	T	P	L	T	P	Total
TRIBOLOGY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The basic objective of the subject is to deal fundamentals of friction, wear and lubrication.
- The subject is useful in understanding the nature of surfaces of engineering materials.
- The basic objective of the subject is to learn about types of lubricants.
- The subject is useful in understanding the various tribological applications.

Pre requisite(s): Material Science, Machine Design I & II.

COURSE CONTENTS

UNIT- I

Fundamentals of Tribology: Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques, statistical description.

UNIT- II

Friction of Surfaces: Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods, friction of non metallic materials.

UNIT- III

Wear Mechanism: Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-IV

Theory of Lubrication: Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizes, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring, Additives in lubricants.

UNIT- V

Design for Tribological Elements: An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Basic Equation for fluid film lubrication Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication.

Learning Outcomes:

Upon completing the course, student will be able to:

- Understand and importance of Tribological phenomenon
- Optimize the friction and wear rate.
- Understand the wear mechanism.
- Determine the application of Lubricants.

BOOKS RECOMMENDED:

- Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975
- Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982
- Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999.

LIST OF PRACTICAL ASSIGNMENTS

- Performance analysis of Journal Bearings.
- Experimental analysis of Lubricants.
- Experimental analysis of Friction on different material.
- Study of method for Wear Debris analysis.
- Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E5	L	T	P	L	T	P	Total
Computational Fluid Dynamics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: The objective of the subject is to

- Introduce the students about the new and advanced methods in fluid dynamics
- Enable the students to use computer systems and related software for fluid dynamics.
- Simulate the various flow conditions involving heat transfer and fluid flow.
- Simulate the real life problems.

Pre requisite(s): Fluid Mechanics, Thermodynamics, Engineering Mathematics, Engineering Graphics

COURSE CONTENTS

UNIT I

Introduction to Fluid Dynamics: Review of conservation equations, Continuum concept, control volume equations, Ideal fluid flow and hydraulic singularities, Navier-stokes equations, and their use. Concept of compressible flow, one dimensional isentropic flow, normal shock, flow with-friction, heat transfer, boundary-Layer theory and applications

UNIT II

Boundary Layer Theory: Basic concepts, Boundary Layer Parameters, Boundary Layer on flat plate, Hiemenz flow, flow near rotating disc. Von-Karman Momentum Equation. General Properties of Boundary Layer equations, Theory of stability. Theory of similarity in heat transfer and exact solutions. Turbulence, correlation coefficient.

UNIT III

Numerical Methods: Fluid Dynamics Equations in Eulerian systems, the characteristic method, finite element methods and application in fluid dynamics, solution of physical flow problems. Scaling and nondimensionalisation Order of Magnitude method.

UNIT IV

Computational Methods: Algebraic equations, ordinary differential equations, Numerical solutions of non-linear equation. Problems leading to system of linear equations. Techniques for solving system of linear equations (direct and iterative). Linear and non linear regression techniques to correlate experimental data. Numerical Integration, application to flow processes. Solution to partial differential equations, Difference forms, implicit and explicit methods for steady state and transient problems.

UNIT V

Optimisation Methods: Classical optimization methods, unconstrained minimization. Univariate, conjugate direction, gradient and variable metric methods, constrained minimization, feasible direction and projections. Integer and Geometric programming, genetic algorithms.

Learning Outcomes:

- Understand the various flow situations numerically
- Analyse the flow patterns studied in fluid mechanics
- Simulate the various flow situations
- Apply optimisation methods to find most optimum solution.

BOOKS RECOMMENDED:

- Anderson, J. D., *Computational Fluid Dynamics: The Basics with Applications*, Pearson Education, 2005.
- Veerstig, H and W. Malasekra, E. B., *An Introduction to Computational Fluid Dynamics : The Finite Volume Method*, Pearson, 2e, 2009.
- Streeter, V. L and Wylie, E. B., *Fluid Dynamics*, McGraw-Hill Co, 2003.
- White F., *Fundamentals of Fluid mechanics*, McGraw-Hill Co, 2003.
- Wirz H.J. and Smolderen J.J., *Numerical Methods in Fluid Dynamics*, McGraw-Hill, 1978.

LIST OF PRACTICAL ASSIGNMENTS

- Introduction to CFD software.
- To simulate flow over the flat plate.
- To simulate flow over the cylinder.
- To simulate flow over an airfoil.
- To simulate flow through nozzles and diffusers.
- To simulate flow through Pipe of various cross-section.
- To simulate flow through convergent-divergent nozzle.
- To simulate flow across structural element.

B. E. IV YEAR COMPUTER ENGINEERING DEPARTMENT
(CBCS) L -Lecture, T – Tutorial, P – Practical, PC-Programme core, PE-Programme
Elective, CBCS-Choice based credit system

Semester-VII

S	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	CER7PR	Project Phase -I	--	0-0-7	7
2.	CER7C1	Distributed Computing	PC	3-1-0	4
3.	CER7C2	Cloud Computing	PC	3-1-1	4+1(P)
4.	CER7C3	Artificial Intelligence	PC	3-1-1	4+1(P)
5.	CER7EX	--	PE	3-1-1	4+1(P)
6.	CER7V7	Comprehensive Viva - VII	Virtual	0-0-4	4
TOTAL CREDITS					30
Programme Electives for VII Semester					
1	CER7E1	Machine Learning(Elective)	PE	3-1-1	4+1(P)
2	CER7E2	Optimization Algorithms & Techniques	PE	3-1-1	4+1(P)
3	CER7E3	Robotics and Numerical Control	PE	3-1-1	4+1(P)
4	CER7E4	Computer Vision	PE	3-1-1	4+1(P)
5	CER7E5	VLSI Design	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER7C1 Distributed Computing	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Basic Concept-Concepts of Distributed Systems: Introduction, Distributed computing models, Software concepts, Design issues in distributed systems, Client-server model, WWW 1.0 and 2.0. Network Communication: LAN and WAN technologies, OSI Model and Internet protocols, ATM, Protocols for Distributed systems

Unit-II

Distributed Computing System DCS design goals, Transparencies, Fundamental issues, Distributed Coordination, Inter-process Communication: Message Passing and its features, IPC message format, IPC synchronization, Buffering, multi datagram messaging, process addressing techniques, failure handling, Formal Models for message passing systems, Broadcast and converge cast on a spanning tree, Flooding and building a spanning tree, Constructing a DFS spanning tree with and without a specified root

Unit-III

Remote Communication: Introduction, RPC basics, RPC implementation, RPC Communication, Other issues, Sun RPC, RMI basics, RMI Implementation, Java RMI

Unit-IV

Synchronization: Clock synchronization, Logical clocks, Global state, Mutual exclusion, Election algorithms: Bully algorithm, Ring algorithm, Leader election in rings, anonymous rings, Asynchronous rings, synchronous rings, election in wireless networks

Unit-V

Deadlock: Deadlocks in distributed systems, Deadlock in Message communication, Distributed Shared Memory: Concepts, Hardware DSM, Design issues in DSM systems, Implementation issues, Heterogeneous and other DSM systems, Naming: Overview, Features, Basic concepts, System oriented names, Object locating mechanisms, Issues in designing human oriented names, Name caches, Naming and security, DNS

Distributed database system: A Case study

RECOMMENDED BOOKS

- Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University Press
- Distributed Systems: Principles and Paradigms, Taunenbaum
- Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg, Pearson Educa
- Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition,
- Hagit Attiya and Jennifer Welch, Wiley India

Learning Outcomes:

After learning the course the students should be able to

- Understand distributed systems
- Know various types of transparencies which Distributed OS should provide
- Understand and analyze Message passing models
- Understand RPC and implement it using manual or automatic stub generation
- Know various synchronization issues
- Know, analyze various election algorithms
- Implement threads Understand distributed systems
- Know various types of transparencies which Distributed OS should provide
- Understand and analysis Message passing models
- Understand RPC and implement it using manual or automatic stub generation
- Know various synchronization issues
- Know, analyze various election algorithms
- Implement threads
- Know File systems
- Compare various Distributed OS

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE IV Year Computer Engineering (Semester – A)				
Subject Code : CER7C2	Instructions Hours per Week			Credits			
Subject Name: Cloud Computing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	4

Course Objective:

To study the latest Computing Technologies of Computer Engineering.

COURSE CONTENT

Unit-I: Introduction to Cloud Computing

Cloud computing introduction and overview, history, characteristics of cloud, service and deployment models, Role of virtualization in enabling the cloud, Applications, providers of IaaS, PaaS and SaaS; challenges, advantages and disadvantages, Issues, SOA Programming model, Cloud based OS, deployment tools, cloud as green computing model.

Unit –II: Virtualization

Introduction to virtualization, characteristics, virtualization at infrastructure level, CPU virtualization, storage virtualization, network virtualization, Hypervisors, SAN, VLAN, Server virtualization, data center challenges and solutions, scaling a cloud infrastructure.

Unit-III : Service management in cloud

Service monitoring, load balancing, database recovery, backup management, virtual machine management, SLA. Migration of virtual Machines and techniques, different types of management issues.

Unit-IV: Issues and challenges in cloud

Various issues in cloud, cloud security services, secure cloud software requirements, cloud security challenges, network security, virtual machine security, threads.

Unit-V: Using mobile cloud

Working with mobile devices, cloud services applied in smartphone, mobile web services, performance synchronization, Defining WAP & other protocols, Fog computing.

Case study: google app engine, amazon open stack, Aneka, Microsoft Azure.

Recommended Books:

- Rajkumar Buyya; Cloud Computing Principles and Paradigms; John Wiley & Sons 2011.
- Rajkumar Buyya; Mastering Cloud Computing; Elsevier Inc 2013.
- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
- Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach” McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.

IIT NPTEL links:

- https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIzy1cbwIMvGF1EsV4ZtAe8vA_7I (Prof S K Ghosh)
- <https://www.youtube.com/watch?v=NzZXz3fJf6o&list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J>

Learning outcomes

Introduce the broad perceptives of cloud architecture and model

- Apply different cloud programming models as per need.
- Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications

List of practicals:

- Implementation of virtualization using VMware or Virtual Box.
- Configuration of virtual machine for Storage unit, NIC, Processors and Memory.
- Configuration of Hardware and software services of virtual machine
- Configure IaaS, PaaS and SaaS for users.
- Add new cloud services for local machine.
- Design and deploy new web services for cloud users.
- Manage user account and services in cloud.
- Manage cloud database for remote users.
- For the cloud users: Create, Update, delete, and modify the database for services.
- Develop new services for cloud automation like: service update, upload data, backup.
- Configure and manage the cloud for automatic data recovery and backup.
- Working With Goggles APP engine and Amazon AWS services.
- Identify and analyze the principal issues in troubleshooting virtual environments.
- Performance evaluations and critical evaluations of a small scale virtual environment.
- Case Study: PaaS (Face book, Google App Engine), SaaS (Desktop Apps) .
- Case Study: NoSQL databases, MapReduce.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER7C3 Artificial Intelligence	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- * Study the concepts of Artificial Intelligence.
- * Learn the methods of solving problems using Artificial Intelligence.
- * Learn the knowledge representation techniques, reasoning techniques and planning
- * Introduce the concepts of Expert Systems and machine learning.

Pre requisites: Data Structures and Algorithms

COURSE CONTENTS

UNIT-I

Introduction: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics Problem solving methods – Defining the problem as state space search, Problem graphs, Matching, Indexing and Heuristic functions.

UNIT-II

Search Techniques: Hill Climbing-Depth first and Breath first, heuristic search strategies- Best-first search, A*, AO* search, Constraints satisfaction, Means end analysis, simulated annealing, etc. Measure of performance and analysis of search algorithms. Adversarial search –Minimax search procedure, alpha-beta pruning, iterative deepening, genetic algorithms - Related algorithms, etc.

UNIT-III

Representation of Knowledge : Game playing - Knowledge representation, Knowledge representation using Predicate logic,Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge. Knowledge representation -Production based system, Frame based system, Scripts, CD, Ontologies, Semantics web and RDF.

UNIT-IV

Knowledge Inference and Planning: Inference – Backward chaining, forward chaining, Rule value approach, uncertain knowledge and reasoning: Probabilistic reasoning, Bayesian networks, Fuzzy logic and reasoning, Theory-Bayesian Network-Dempster - Shafer theory. Planning overview, components of planning system, Goal stack planning, Hierarchal planning, and other planning techniques.

UNIT-V

Machine Learning and Expert Systems: Overview of different forms of learning, Statistical methods, Learning Decision Trees, Neural Networks, Clustering- basic agglomerative, divisive algorithm based on similarity/dissimilarity measures.Introduction to Natural Language Processing. Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge. Typical expert systems - MYCIN, DART, XOON, Expert systems shells. Basic knowledge of Prolog programming language.

Learning Outcomes:

Upon completing the course, students will be able to:

- Familiar with Artificial Intelligence, its foundation and principles.
- Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications.
- Learn Prolog Programming to program intelligent systems.

BOOKS RECOMMENDED:

- Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill- 2008.
- Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007 Peter Jackson, “Introduction to Expert Systems”, 3 rd Edition, Pearson Education, 2007.
- Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).
- <http://nptel.ac.in>.
- Carl Townsend, “Introduction to Turbo PROLOG”, BPB Publication.
- Ivan Bratko, ”Prolog Programming for Artificial Intelligence”, 3rd Edition, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IVYear B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER7E1 Machine Learning	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III

Unsupervised Learning: Introduction to unsupervised learning -Clustering -Classification of clustering algorithms, Computational Learning theory, PAC Learning, VC dimension.

Artificial Neural Networks Learning: Neural Network Representation, Perception, Back propagation algorithm.

Unit-IV

Language Learning: Classification problems in language: word-sense disambiguation, Formal Language learning, introduction to Hidden Markov models (HMM's).

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators..

Unit-V

Genetic Algorithms (GAs): Motivation, Representing Hypotheses, Genetic operators, fitness Function and Selection, Working of Genetic Algorithm, Evolutionary Programming and Genetic Programming, Case studies of Machine Learning data sets .

RECOMMENDED BOOKS

- Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

- Problem based on different machine Learning algorithm
- Works on different machine learning Tools
- Case Study on different data sets

**B. E. IV YEAR ELECTRONICS & INSTRUMENTATION ENGINEERING (CBCS) L -
Lecture, T – Tutorial, P – Practical, PC-Programme core, PE-Programme Elective, CBCS-
Choice based credit system**

Semester-VII

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	EIR7C1	PROJECT PHASE-I	PC	0-0-7	7
2	EIR7C2	OPERATING SYSTEM	PC	3-1-0	4
3	EIR7C3	INTELLIGENT INSTRUMENTATION SYSTEM	PC	3-1-1	4+1(P)
4	EIR7C4	PROCESS INSTRUMENTATION AND CONTROL	PC	3-1-1	4+1(P)
5	EIR7EX	--	PE	3-1-1	4+1(P)
6	EIR7V7	COMPREHENSIVE VIVA -VII			
PROGRAMME ELECTIVE (ANY ONE FROM LIST GIVEN BELOW)					
1	EIR7E1	CIRCUIT DESIGN USING HDL	PE	3-1-1	4+1(P)
2	EIR7E2	DATA MANAGEMENT SYSTEM BASE	PE	3-1-1	4+1(P)
3	EIR7E3	ADVANCE CONTROL SYSTEM	PE	3-1-1	4+1(P)
4	EIR7E4	SPEECH AND IMAGE PROCESSING	PE	3-1-1	4+1(P)
5	EIR7E5	DATA ACQUISITION SYSTEM	PE	3-1-1	4+1(P)
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C1	L	T	P	L	T	P	Total
PROJECT PHASE-I	0	0	7	0	0	7	7

Learning Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

Prerequisites: Electronics and Computer related subjects till III year.

COURSE CONTENTS

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics/Communication ,VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Work in a team
- Develop small working projects through designing, analysis and testing of model
- Able to give presentation on the project developed

BOOKS RECOMMENDED:

- Reference books and web links of the relevant material the must be consulted as advised by the guide.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics and Instrumentation)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C2 OPERATING SYSTEM	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The course contents are aimed to provide:

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management

Prerequisites: Basic knowledge of Data Structures and Computer Organization.

COURSE CONTENTS

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

UNIT-IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

Upon Completing the Course, Student will able to learn:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

- Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
- Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
- Tanenbaum, Modern Operating Systems, PHI.
- W. Stalling, Operating Systems, Macmillan.
- H. M. Dietel, Operating Systems, Addison Wesley Longman.
- Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
- Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)				
Subject Code & Name		Instructions Hours per Week		Credits				
EIR7C3 Intelligent Instrumentation System		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Learning Objectives:

To get students familiar with interfacing of computer systems with the control theory thus making it an automatic system and to learn the Lab View programming and its application in different process industries.

Prerequisites (if any):

Control System, Transducers & Applications, Computer networking, Communication Systems

COURSE CONTENTS

UNIT-I

Introduction: Introduction to intelligent instrumentation, Historical perspectives, Current status, Software based instruments. Virtual Instrumentation: Introduction to graphical programming, data flow and graphical programming techniques.

UNIT-II

Instrumentation Standard Protocol: HART protocol, Field Bus H1, GPIB, CAN, Industrial Ethernet: introduction, frame structure, programming, implementation, benefits, advantages and limitation.

UNIT-III

Introduction To SCADA: SCADA system, evolution, objectives, benefits and function of SCADA system. SCADA in process control, application, SCADA function, SCADA hardware: RTU, Single board RTU, Basic Operation, Features of SCADA, SCADA software: ISO model, DNP3 protocol, IEC60870 protocol, MODBUS protocol. Power System Automation: benefits, architecture classification, implementation, SCADA applications.

UNIT-IV

Distributed Control System: Introduction and overview, history, system architecture, system element. Difference between Centralized and Distributed Control System, Overall tasks of DCS. Displays: Group display, Overview display, Detail display. Local Control Units, mean time between failures, Data Highways, Fieldbuses, Multiplexers and remote sensing terminal units, I/O hardware, Set-point stations

UNIT-V

PC Hardware review and Instrumentation buses: structure, timing, interrupts, DMA, operation systems, ISA, PCI, USB, PCMCIA buses. IEEE488.1 and IEEE488.2 serials, SCXI and PXI.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the concept of intelligent instrumentation
- Identify the optimized protocol selection according to the application area
- Design complete automatic process control system
- Analyze the DCS and SCADA systems In industry

BOOKS RECOMMENDED:

- Liptak B.G, *Instrument Engineers Handbook*, Clinton Book Company, (1982)
- D.Patranabis, *Principles of Industrial Instrumentation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999.
- SteveMackey, Edwin Wright, *Practical Industrial Data Network I/e*, Elsevier Publications, 2004
- David Bailey, Edwin Wright, *Practical SCADA for Industry, I/e*, Elsevier Publications, 2003
- Poppovik Bhatkar, *Distributed Computer Control for Industrial Automation*, Dekkar Publications.

List of Practical Assignments:

To perform the following operations using Lab View.

- Basic arithmetic operations
- Boolean operations
- Sum of 'n' numbers using 'for' loop
- Factorial of a give number using for loop
- Sum of 'n' natural numbers using while loop
- Factorial of a give number using while loop
- Sorting even numbers using while loop in an array
- Array maximum and minimum
- Bundle and unbundle cluster
- Flat and stacked sequence
- Application using formula node
- Median filter
- Discrete cosine transform
- Convolution of two signals
- Windowing technique
- Instrumentation of an amplifier to acquire an ECG signal
- Acquire, analyse and present an eeg using virtual Instrumentation.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C4 Process Instrumentation & control	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

The course aims to provide students with the knowledge about behaviour of industrial processes, builds the concepts related to operation and control of dynamic processes, and learns various strategies of processes control. Learn theoretical and practical aspects for the design and operation of process control systems.

Prerequisites (if any):

Control System, Sensor & Transducers

COURSE OF CONTENTS

UNIT-I: Introduction to process control

Objectives of Control, Process Characteristics: Process Equation, degrees of freedom, process and control lag, dead time, load disturbance and its effect on processes, analog control, digital control, Self regulating processes, final control elements, valves and actuators, their various characteristics, piping and instrumentation diagram,

UNIT-II: Control modes

Basic Control action, two position, multi-position, floating Control modes, Continuous controller modes: Proportional, integral, derivative, composite controller modes-I, P-D, P-I-D, comparisons of these control actions, design of various kinds of analog controllers, Parameters Adjustment, Controller tuning methods,

UNIT-III: Controllers- other modes

Modelling of simple systems-gas liquid and thermal systems, Concept of resistance and capacitance, Nozzle-flapper system, Pneumatic relays and amplifiers, Hydraulic systems, realization of various kinds of controllers for hydraulic and pneumatic applications.

UNIT-IV: Discrete state process control

Discrete state Control, Discrete state variables, Event sequence description, ladder diagram, relay sequencer, Programmable logic controller- Architecture, operation and programming

UNIT-V: Case studies

Cascade control, ratio control, feed-forward control, selective Control, Split range Control
Boiler Control: Combustion Control, Oxygen/CO trimming, Feedwater Control, Furnace Control, Steam temp. Control, Distillation column control

Recommended books:

- D.P. Eckman “Automatic Process control” Wiley Publication.
- Patranabies “Principles of Process control” Tata Mc Graw Hill Pub, (2006)
- P. Harriott “Process control” McGraw-Hill: New York, 1964
- Curtis Johnson “Process control Instrumentation Technology” Prentice Hall, New Delhi (2005)
- B.G. Liptak “Hand Book of Process control” Taylor & Francis Ltd
- Shinskey, “Process Control systems: Application, Design & Tuning” 4th Edition, McGraw Hill, Singapore (1996)

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the basic principles, terminologies, mathematical analysis and block diagrams related to the industrial processes.
- Comprehend the use of various components, instrumentation and strategies for controlling and fine tuning the process.
- Develop skills for the efficient design of process control loops for process engineering plants.

List of Experiments

- Study, design and fine tuning of a pressure based control loop.
- Study, design and fine tuning of the flow based control loop.
- Study the ratio control system for the mixing of two fluid.
- Study cascade control based strategy for the control of liquid flow in a closed channel.
- Design and development of advanced PC based multi process control system.
- Study and implementation of various control strategies using temperature control system
- Study of a PID controller.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions per Week		Hours	Credits			
EIR7E1 CIRCUIT DESIGN USING HDL	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objective: To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL. Perform synthesis, place, and route of a digital design into a target FPGA.

Prerequisite: Digital Design, C language.

COURSE CONTENTS

Unit I Introduction to VLSI and HDL History of IC Design, IC Technology, Moore's Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic- Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski's Y Chart.

Digital system design process, Hardware simulation, Levels of abstraction, VHDL requirements, Elements of VHDL Top down design, VHDL basic language Elements, VHDL operators, Timing, Concurrency, Objects and classes.

Unit II Behavioural Modelling

Signal assignments ,Concurrent and sequential assignments., Entity Declaration, Architecture Body, Behavioural Modelling, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers.

Unit III Dataflow and Structural Modelling Techniques: Data flow Modelling, Concurrent Assignment statements, Block statements, Structural Modelling, Component declaration and Instantiation, Generate statements.

Unit IV Advance Topics in VHDL

Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Attributes.

Unit V Design for Synthesis

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints, Synthesis for dataflow and structural models.

Learning Outcomes:

At the end of the course, the students would be:

- Able to design digital systems through HDL language
- Simulation, synthesis and implementation of HDL code
- Implementation of code on FPGA/CPLD

BOOKS RECOMMENDED:

- J. Bhasker, *VHDL Primer*, 3/e, Addison Wesley, 1999.
- Sudhakar Yalamanchili, *Introductory VHDL-From Simulation to Synthesis*, Pearson Education, 3/e Indian Reprint.
- Douglas Perry, *VHDL*, 3/e Edition, McGraw Hill 2001.
- Peter.J.Ashenden, *The Designer's Guide to VHDL-AMS*,
- Charles.H.Roth, *Digital system Design using VHDL*, Thompson Publishers, 2/e Edition, 2007.
- Ben Cohen, *VHDL-Coding style and Methodologies*, Kluwer academic Publishers, 1995.
- Volnei. A.Pedroni, *Circuit Design with VHDL*, MIT Press Cambridge, 2004.

List of Practical Assignments:

VHDL Programming using Xilinx ISE

Note: For Q1 to Q5 use behavioral modeling. For Q6 to Q7 use data flow modeling and for Q8 to Q10 use structural modeling.

Q.1 Write a VHDL code for a Full Adder.

Q.2 Write a VHDL code for 8X1 Multiplexer using if-elseif statement, case statement and nested if statement and compare their delay and area.

Q.3 Write a VHDL code for a 3X8 decoder using case statement.

Q.4 Write a VHDL code for a J-K flip-flop triggered at falling edge of clock pulse. Also include clear and reset pins synchronized with clock pulse.

Q.5 Write VHDL code for a synchronous 3-bit binary up-down counter. Include a selection line for selecting the mode of counting upwards or downwards.

Q.6 Design a combinational circuit with three inputs x, y, and z and three outputs A,B and C. when the binary input is 0,1,2, or 3 the binary output is one greater than the input otherwise the binary output is one less than the input.

Q.7 Write a VHDL code for a 3-bit binary code to 3-bit gray code conversion.

Q.8 Design a 4-bit ripple counter using T-Flip flop as basic component.

Q.9 Design a 4-bit Magnitude comparator using 1-bit Magnitude comparator as basic entity.

Q.10 Design a circuit of a 3-bit parity generator and the circuit of a 4-bit parity checker using an odd parity bit.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions per Week		Hours	Credits			
EIR7E5 SPEECH AND IMAGE PROCESSING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: Student will learn the basic principles and tools used to process speech, images and videos, and how to apply them in solving practical problems of commercial and scientific interests.

Prerequisites: Signals and systems, Digital signal processing

COURSE CONTENTS

UNIT I- Digital Speech Processing

The Fundamentals of Digital Speech Processing. A Review of Discrete -Time Signal & Systems , the Z-transform, the DFT, Fundamental of Digital Filters, FIR system, IIR Systems. Time–Domain Methods for Speech Processing. Time-Dependent Processing of speech, short -time energy and Average Magnitude, Short time Average Zero-Crossing Rate. Digital Representation of speech Waveform Sampling speech signals, statistical model, Instantaneous quantization, Instantaneous companding, quantization for optimum SNR, Adaptive quantization, Feed-forward Feedback adaptations.

UNIT II- Linear Predictive Coding of Speech

Block diagram of Simplified Model for Speech Production. Basic Principles of Linear Predictive Analysis-The Auto Correlation Method. The Prediction Error Signal. Digital Speech Processing for Man-Machine Communication by voice. Speaker Recognition Systems-Speaker verification and Speaker Identification Systems

UNIT III-Digital Image

Different stages of Image processing & Analysis Scheme. Components of Image Processing system, Multiprocessor Interconnections. A review of various Mathematical Transforms. Image Formation: Geometric Model, Photometric Model. Image Digitization: A review of Sampling and quantization processes. A digital image.

UNIT IV- Image Processing

Image Enhancement: Contrast Intensification, Smoothing, Image sharpening. Restoration: Minimum Mean –Square Error Restoration by Homomorphic Filtering. Image Compression: Schematic diagram of Data Compression Procedure, Lossless compression–coding. Multivalued Image Processing, Multispectral Image Processing, Processing of colour images

UNIT V- Case study on Speech and Image Processing

Learning Outcomes:

Upon Completing the Course, Student will able to:

- learn the theory behind fundamental processing tasks including image/video enhancement, recovery, and compression.
- learn how to perform these key processing tasks in practice using state-of-the-art techniques and tools like optimization toolboxes to statistical techniques.

BOOKS RECOMMENDED:

- Milan Sonya, Vaclav Hlavac & Roger Boyle, “Image Processing Analysis and Machine Vision”, Vikas Publishing House
- A.K. Jain, “Digital Image Processing”, Pearson Education
- Chanda, B. & Majumder, D. D, “Digital Image Processing & Analysis” , Prentice Hall (India)

List of Practical Assignments:

Practical based on Texas Instruments DSP Processor kit, it's interfacing with different peripherals and communication to other systems.

B. E. IV YEAR INFORMATION TECHNOLOGY DEPARTMENT
(CBCS) L -Lecture, T – Tutorial, P – Practical, PC-Programme core, PE-Programme Elective,
CBCS-Choice based credit system

Semester – VII

S.No.	Sub_Code	Sub_Name	Type	L-T-P	Credits
1	ITR7PR	Project Phase-I/Project Phase-II	PC	0-0-0	7
2	ITR7C1	Cloud Computing	PC	3-1-1	4+1(P)
3	ITR7C2	Computer Graphics	PC	3-1-1	4+1(P)
4	ITR7EX	--	PE	3-1-1	4+1(P)
5	ITR7G5	Artificial Intelligence	GE	3-1-0	4
6	ITR7V7	Comprehensive Viva - VII	Virtual	0-0-4	4
Total Credits					30

Elective Subjects:

1	ITR7E1	Big Data Analytics	PE	3-1-1	4+1(P)
2	ITR7E2	Foundation of Modern Networking	PE	3-1-1	4+1(P)
3	ITR7E3	Electronic Commerce	PE	3-1-1	4+1(P)
4	ITR7E4	Cyber Crime and Digital Forensics	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Information Technology (Full Time)			
Subject Code & Name	Instructi ons Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR7C1 Cloud Computing							
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

To provide knowledge of cloud architecture, deployment models. To introduce broad perceptiveness of cloud services.

To introduce about storage and database management in cloud computing. To make them understand about resource management in cloud computing

To make them familiar with the various cloud security issues and research trends in cloud

Pre requisites:

Fundamentals of Computer Network, Storage and Internet Technology

COURSE CONTENT

UNIT-I

Introduction to Cloud Computing and Cloud Computing Architecture: Computing era, Cloud evolution, Principles of Parallel and Distributed computing, Web services, Cloud Computing Introduction, Characteristics as per NIST, Need of Cloud Computing, Cloud Computing Reference Model, Cloud Architecture, Cloud Service Models, Cloud Deployment Models, Cloud Adaptation Policy.

UNIT-II

Virtualization and Migration: Concept, Benefits of Virtualization, Challenges in Virtualization, Characteristics of Virtualized environments, Virtualization Techniques, Hypervisor, Components of Virtualization, Hot and Cold conversion, Resource Virtualization, Virtualization Platforms.

Cloud Migration: Migrating Strategies, Risk Associated, Precautions

UNIT-III

Inter Cloud Computing/Federated Environment:

Legal and Compliance Issues- - Global Exchange of Cloud Resources, Inter Cloud Resource Management, Service level Agreement management. Cross Border Data Storage Issue, Cloud Governance Model, Compliance monitoring, Ownership of Data, storage and backup policy.

Federated Cloud- Characteristics, Cloud Federation Stack, Motivation for Cloud Interoperability, Cloud Interoperability Scenario, Challenges, Intercloud enabling techniques, Inter-Cloud Standards, Inter-Cloud Project examples.

UNIT-IV

Threats, Security and Disaster Management in Cloud Computing:

Cloud threats- Threat actors in cloud, Current Threats in cloud, Mitigation techniques for Cloud threats, Cloud Contracting models, Methods for Data loss prevention, Viability of third party services vendors.

Data Security issues in Cloud storage- Cloud Security Challenges, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data in Rest, Data in Motion, Identity and Access Management, Authentication Services in cloud.

Disaster Management- Disaster recovery as a service model (**DRaaS**), Recovery Point Objectives, Recovery Time Objectives, Monitoring, Load Balancing, Database Recovery, Business Continuity.

UNIT-V

Resource Management in Cloud Computing, Case Studies, Advance Topics: Performance and Scalability of Cloud Services, Data Centre, Components, Architecture with Reference Model, Resource Provisioning and allocation approaches, Challenges in Resource Management.

Cloud Platforms: Case studies on Cloud Platforms - Amazon web services, Google App Engines, Microsoft Azure, Salesforce Cloud.

Cloud Application Development, Green Computing, Fog Computing, Big Data application on Cloud, Cloud Mining, Mobile Cloud.

Cloud Deployment- Setting up a Small Cloud, Cloud Simulator.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand about cloud architecture and deployment models Learned about broad perceptive of cloud services
- Learned about database management in cloud computing
- To make them understand about resource management in cloud computing
- To make them familiar with the various cloud security issues and research trends in cloud

BOOKS RECOMMENDED:

- Rajkumar Buyya; Cloud Computing Principles and Paradigms; John Wiley & Sons 2011.
- Rajkumar Buyya; Mastering Cloud Computing; Elsevier Inc 2013.
- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach"
McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.
- Dimitris N. Chorafas, "Cloud Computing Strategies" CRC Press; 1 edition [ISBN:
1439834539],2010.

List of Practical Assignment:

- During the learning of course, students need to do assignments:
- Configuration of Baremetal or Para Hypervisor.
- Study of various cloud data centers and green cloud models.
- Installation and configuration of Eucalyptus/Aneka cloud.
- Study of cloud CRM applications i.e Salesforce, Zoho.
- Hadoop Configuration with Hortonworks.
- Deployment of CloudSIM tool.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7C2	L	T	P	L	T	P	Total
Computer Graphics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To provide knowledge of different techniques used for visual object representation.

Familiarize students with different hardware/ software and algorithm implementation used by today's input/output devices.

Develop skills to design and implement various 2D/3D objects representation in virtual reality.

Learning about the basics of computer based games and data visualization.

Pre requisites:

Programming language: C++/JAVA.

COURSE CONTENTS

UNIT-I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

UNIT-II

Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; Hard Copy devices: Printers and Plotters; Input devices: Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

UNIT-III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

UNIT-IV

Three Dimensions: 3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, B spline.

UNIT-V

Shading and Color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Able to learn the basics of 2D/3D design and its implementations.
- Able to write programs for latest Input/ Output Devices and Human computer Interaction.
- Students will be aware about the latest technology used in display technology.

BOOKS RECOMMENDED:

- Hearn Donald and Baker M.Pauling, Computer Graphics, 2/e, Prentice Hall of India.
- Hearn Donald and Baker M.Pauling, Computer Graphics with OpenGL, 3/e, Prentice Hall, 2004.
- David F. Rogers, Procedural Element of computer Graphics, McGraw Hill International.
- William M. Newman Robert F. Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
- J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, Introduction to ComputerGraphics, Addison-Wesley, 1994. [6] Zhigang Xiang and Roy Plastock, Computer Graphics, Tata McGraw Hill Publications.

List of Practical Assignments:

- Implement various line drawing algorithm & compare it on the basis of performance and prepare the table.
- Implement various Circle drawing algorithm & compare it on the basis of performance and prepare the table.
- Implement Cohen Sutherland and Cyrus Back line clipping algorithms and display the clipped portion of line as demonstration.
- Implement Cohen Houghman polygon clipping algorithm to clip a polygon against a rectangular boundary and combine Cohen Houghman polygon clipping algorithm with Cyrus Back line clipping algorithms to clip a polygon against another polygon and display the clipped portion of polygon.
- Implement the following 2D transformation using matrix multiplication: Translation Rotation Scaling Shearing Reflection
- Implement parallel (oblique and axonometric) and perspective projection and display following objects using projections: Pyramid and Rectangles
- Implement the following 3D transformation using matrix multiplication. And display using perspective projection: Translation Rotation Scaling Shearing Reflection
- Implement rotation of an object about any arbitrary axis.
- Implement reflection of an object about any arbitrary plane. 11. Implement the L-system for generation of symmetric objects (Fractals)
- Generate 2D curve and surfaces using implementation of Bezier curve.
- Implement the following visible surface detection algorithm and compare them on the basis of complexities and execution time. Z-buffer Scan-line Depth sorting Octree Ray Casting.
- Implement the following rendering algorithm and compare them on the basis of complexities and execution time. Flat Shading Gouraud shading Phong shading Ray tracing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7E1	L	T	P	L	T	P	Total
Big Data Analytics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To increase knowledge of the Big Data landscape.

Develop a comprehensive knowledge R, Hadoop and Spark for effective data analysis.

Develop skills in independent managing Big Data projects and related issues. Develop ability to carry out research in area of Big Data Analytics.

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Prerequisites:

Some programming experience (in any language) is recommended.

COURSE CONTENTS

UNIT- I

Introduction to Big Data : Definition & importance of Big Data - Five Dimensions of Big Data - Volume, Velocity, Variety, Veracity, Valance – Industry examples – Terminologies – Structured Data, Unstructured Data, Semi Structured Data, Streaming Data, Real-Time Data, Meta Data, data at rest, Big Data Applications, Challenges Process of Data Analysis.

UNIT-II

Big Data analytics: Introduction – Concepts - Storing Big Data - Analyzing your data characteristics - Selecting data sources for Analysis - Eliminating Redundant Data - Open Source Technology for Big Data analytics - Predictive Analytics - Crowdsourcing Analytics - Computing Platforms, Limitations, and Emerging Technologies - Consumption of analytics - Modern Analytic Approaches – Ensemble Modeling, Commodity Models, and Text Analysis.

UNIT- III

Introduction to R: R-Environment Setup, Programming with R, Basic Data Types, Vectors, Creating and Naming Vectors, Vector Arithmetic, Introduction to Factors, Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Subsetting of Data Frames, Extending Data Frames, Sorting Data Frames, Creating a List: Creating a Named List, Accessing List Elements, Reading from CSV files, Writing to CSV file.

UNIT- IV

Introduction to Hadoop: Introduction to learning and knowledge analytics - Big Data From Technology Perspective – Hadoop - Components of Hadoop, Application Development in

Hadoop, The Distributed File System - HDFS, GPFS, Hadoop Cluster Architecture, Batch Processing - Low Latency NoSQL.

UNIT- V

Introduction to Apache Spark: Resilient Distributed Datasets (RDDs), DataFrames & SparkSQL, Spark Operations, Spark Workflow, Python RDD API Examples, Broadcast Variables and Accumulators, Spark's Main Use Cases, Case Studies – Market Basket Analysis using R & Spark, Linear Regression using R & Spark.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply Knowledge of Big Data to solve real world big data problems. Understand the fundamentals of R, Hadoop, Spark programming.
- Work on a real life Project, implementing R, Hadoop, Spark Analytics to create Business Insights.
- Undergo into further research in Big Data.

BOOKS RECOMMENDED:

- Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Michael Minelli, Michele Chambers, Ambiga Dhira, Wiley India Pvt Ltd, 2013.
- R for Everyone: Advanced Analytics and Graphics, 1st Ed., Jared P. Lander, Pearson Education, Inc., 2014.
- Big Data Analytics with R and Hadoop, Vignesh Prajapati, Packt Publishing Ltd, 2013.
- Big Data Analytics: Turning Big Data into Big Money, Frank J. Ohlhorst, Wiley, 2012.
- Creating Value with Big Data Analytics: Making Smarter Marketing Decisions, Peter C. Verhoef, Edwin Kooge, Natasha Walk, Taylor & Francis, 2016.
- K Mark Gardener, Wrox Beginning R: The Statistical Programming Language.
- Y. anchang Zhao ,R and Data Mining: Examples and Case Studies . Elsevier in December 2012.
- Alex Holmes, Hadoop in practice, Manning Publications, 2012
- Tom White, Hadoop, The definitive guide, O'Reilly Media, 2010

List of Practical Assignments: (If Applicable)

During the learning of course, students need to do assignments:

- To learn the R Programming language.
 - To explore Rstudio for data Analysis problems.
 - To explore Hadoop for solving the Big data problems. To explore Spark for analysing Big data problems.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7G5	L	T	P	L	T	P	Total
Artificial Intelligence	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

Study the concepts of Artificial Intelligence.

Learn the methods of solving problems using Artificial Intelligence.

Learn the knowledge representation techniques, reasoning techniques and planning Introduce the concepts of Expert Systems and machine learning.

Pre requisites:

Data Structures and Algorithms Analysis of Algorithm

COURSE CONTENTS

UNIT-I

Introduction: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics Problem solving methods – Defining the problem as state space search, Problem graphs, Matching, Indexing and Heuristic functions.

UNIT-II

Search Techniques: Hill Climbing-Depth first and Breath first, heuristic search strategies-Best-first search, A*, AO* search, Constraints satisfaction, Means end analysis, simulated annealing, etc. Measure of performance and analysis of search algorithms. Adversarial search

–Minimax search procedure, alpha-beta pruning, iterative deepening, genetic algorithms - Related algorithms, etc.

UNIT-III

Representation of Knowledge : Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge. Knowledge representation -Production based system, Frame based system, Scripts, CD, Ontologies, Sementic web and RDF.

UNIT-IV

Knowledge Inference and Planning: Inference – Backward chaining, forward chaining, Rule value approach, uncertain knowledge and reasoning: Probabilistic reasoning, Bayesian networks, Fuzzy logic and reasoning, Theory-Bayesian Network-Dempster - Shafer theory. Planning overview, components of planning system, Goal stack planning, Hierarchal planning, and other planning techniques.

UNIT-V

Machine Learning and Expert Systems: Overview of different forms of learning, Statistical methods, Learning Decision Trees, Neural Networks, Clustering- basic agglomerative, divisive algorithm based on similarity/dissimilarity measures. Introduction to Natural Language Processing. Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge. Typical expert systems - MYCIN, DART, XOON, Expert systems shells. Basic knowledge of Prolog programming language.

Learning Outcomes:

Upon completing the course, students will be able to:

- Familiar with Artificial Intelligence, its foundation and principles. Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications. Learn Prolog Programming to program intelligent systems.

BOOKS RECOMMENDED:

- Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill-2008.
 - Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007 Peter Jackson, “Introduction to Expert Systems”, 3 rd Edition, Pearson Education, 2007.
 - Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III)
 - <http://nptel.ac.in>.
 - Carl Townsend, “Introduction to Turbo PROLOG”, BPB Publication.
 - Ivan Bratko, ”Prolog Programming for Artificial Intelligence”, 3rd Edition, Pearson Education.
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**B. E. IV YEAR ELECTRONICS & TELECOMMUNICATION ENGINEERING (CBCS) L -
Lecture, T – Tutorial, P – Practical, PC-Programme core, PE-Programme Elective, CBCS-
Choice based credit system**

Semester-VII

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	ETR7C1	PROJECT PHASE-I	PC	0-0-7	7
2	ETR7C2	OPERATING SYSTEM	PC	3-1-0	4
3	ETR7C3	ANTENNA AND WAVE PROPOGATION	PC	3-1-1	4+1(P)
4	ETR7C4	RF AND MICROWAVE ENGG.	PC	3-1-1	4+1(P)
5	ETR7EX	--	PE	3-1-1	4+1(P)
6	ETR7V7	COMREHENSIVE VIVA - VII	VIRTUAL	0-0-4	4
PROGRAMME ELECTIVE (ANY ONE FROM LIST GIVEN BELOW)					
1	ETR7E1	CIRCUIT DESIGN USING HDL	PE	3-1-1	4+1(P)
2	ETR7E2	WIRELESS ADHOC AND SENSOR NETWORKS	PE	3-1-1	4+1(P)
3	ETR7E3	EMBEDDED SYSTEM	PE	3-1-1	4+1(P)
4	ETR7E4	INDUSTRIAL COMMUNICATION	PE	3-1-1	4+1(P)
5	ETR7E5	SPEECH AND IMAGE PROCESSING	PE	3-1-1	4+1(P)
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics & Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7C1 PROJECT PHASE-I	L	T	P	L	T	P	Total
	0	0	14	0	0	7	7

Learning Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

Prerequisites: Electronics and Computer related subjects till III year.

COURSE CONTENTS

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics/Communication ,VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

Learning Outcomes:

Upon completing the course, Student would be able to:

Work in a team

Develop small working projects through designing, analysis and testing of model Able to give presentation on the project developed

BOOKS RECOMMENDED:

1. Reference books and web links of the relevant material the must be consulted as advised by the guide.

Devi Ahilya University, Indore, India			IV Year B.E. (Electronics and Telecommunication)				
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7C2	L	T	P	L	T	P	Total
OPERATING SYSTEM	3	1	0	3	1	0	4
Duration of Theory							
Paper: 3 Hours							

Learning Objectives:

The course contents are aimed to provide:

- Students will learn how Operating System is Important for Computer System. To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management

Prerequisites: Basic knowledge of Data Structures and Computer Organization.

COURSE CONTENTS

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non-preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

UNIT-IV

Memory Management and File system: Paging, Segmentation and Contiguous memory

allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

Upon Completing the Course, Student will able to learn:

Understands the different services provided by Operating System at different level. They learn real life applications of Operating System in every field.

Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.

They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

- Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
- Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
- Tanenbaum, Modern Operating Systems, PHI.
- W. Stalling, Operating Systems, Macmillan.
- H. M. Dietel, Operating Systems, Addison Wesley Longman.
- Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
- Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)				
Institute of Engineering & Technology								
Subject Code & Name		Instructions Hours per Week			Credits			
ETR7C3		L	T	P	L	T	P	Total
ANTENNA AND WAVE PROPOGATION		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Learning Objectives: This course presents the fundamental concepts of antenna and radio wave propagation. It gives emphasis to the antenna theories, modeling, analysis and design and also the physical behaviors along with the radio wave propagation problems in telecommunication field.

Prerequisites: Knowledge of Electromagnetic field and theory, Fundamentals of Physics

COURSE CONTENTS

UNIT-I

Introduction to types of antennas, radiation mechanism, current distribution on thin wire antenna, radiation pattern like isotropic, directional and omnidirectional, Radiation intensity, gain ,directive gain, directivity, antenna efficiency, effective area, effective length, reciprocity theorem, radar equation, beam efficiency, bandwidth, polarization Antenna temperatures ,FBR ,radiation resistance, Equivalent noise temperature of antenna.

UNIT-II

Poynting theorem, wave equation in terms of electromagnetic potentials and their solution, short electric dipole, retarded vector potential, small current element, small dipole, Finite length dipole, Half wavelength dipole, Infinite perfect conductors, ground effects.

UNIT-III

Introduction to various form of array, array of n isotropic sources of equal and unequal amplitude and uniform spacing, design consideration of Broadside, End fire, Dolphy Tchebyscheff arrays, continuous arrays, rectangular arrays, planar array , binomial array circular array, and super directivity.

UNIT-IV

Huygens' Principle, Hertz and Marconi antenna, ground and antenna losses, High frequency antenna, Dipole antenna, Harmonic antenna and inverted V antenna, Rhombic Antenna, RDF, Loop antenna, Adcock Antennas & direction finder, Folded Antenna, Yagi Uda Antenna, Corner Reflected Antenna, Helical Antenna, Horn Antenna, Slot Antenna, Microstrip Antenna, LPDA Microwave Antenna, Antenna with parabolic reflector, Lens Antenna, Babinet's Principle, Antenna Measurements.

UNIT-V

Modes of propagation, Sky wave propagation, Effect of earth's magnetic field on Ionospheric radio wave propagation, Virtual heights, MUF, LUF, Skip distance, OMF, Ionospheric abnormalities, Multihop propagation, Duct propagation, VLF and ELF propagations.

Learning Outcomes:

Upon completing the course, student will able to grasp the fundamental concept of antenna and its radiation mechanism.

BOOKS RECOMMENDED:

- K.D.Prasad, Antenna and Wave Propagation, 3/e, Satya Prakashan, New Delhi; reprint-2007.
- Constantine A.Balanis, Antenna Theory: Analysis and Design, 2/e, John Wiley & Sons Inc, Noida India.
- John Daniel Kraus, Ronald J. Marhefka, Antennas, 3/e, McGraw-Hill Higher Education
- C.G.Christodoulou, P.F.Wahid, Fundamentals of Antennas: Concepts and Applications,
- SPIE
- S.R.Saunders, Antennas and Propagation for Wireless Communication Systems, 1/e, Wiley, John & Sons, Inc.
- Richard C. Johnson, Henry Jasik, Antenna Engineering Handbook, McGraw-Hill Companies.

List of Practical Assignments:

- ARRANGING THE TRAINER AND PERFORMING FUNCTIONAL CHECKS
- STUDY OF SIMPLE DIPOLE $\lambda/2$ ANTENNA.
- TO PERFORM POLARISATION TEST.
- TO PERFORM MODULATION TEST.
- STUDY OF THE VARIATION IN THE RADIATION STRENGTH AT A GIVEN DISTANCE FROM THE ANTENNA.
- STUDY OF RECIPROCITY THEOREM.
- TO PRACTICE HOW TO USE THE MATCHING STUB PROVIDED WITH THIS TRAINER.
- SWR MEASUREMENT.
- STUDY OF SIMPLE DIPOLE $\lambda/4$ ANTENNA.
- TO STUDY FOLDED DIPOLE $\lambda/2$ ANTENNA.
- STUDY OF YAGI UDA 3 ELEMENT FOLDED DIPOLE.
- STUDY OF YAGI UDA 5 ELEMENT FOLDED DIPOLE.
- STUDY OF YAGI UDA 5 ELEMENTS SIMPLE DIPOLE.
- STUDY OF YAGI UDA 7 ELEMENTS SIMPLE DIPOLE.
- STUDY OF HERTZ ANTENNA.
- STUDY OF ZEPPELIN ANTENNA.
- STUDY OF $\lambda/2$ PHASE ARRAY END FIRE ANTENNA.
- STUDY OF $\lambda/4$ PHASE ARRAY ANTENNA.

- STUDY OF COMBINED CO-LINER ARRAY.
- STUDY OF BROAD SIDE ARRAY.
- STUDY OF LOG PERIODIC ANTENNA.
- STUDY OF LOOP ANTENNA.
- STUDY OF RHOMUBUS ANTENNA.
- STUDY OF GROUND PLANE ANTENNA.
- STUDY OF SLOT ANTENNA.
- ANTENNA CURRENT SENSOR.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7C4	L	T	P	L	T	P	Total
RF AND MICROWAVE ENGINEERING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

To give students the knowledge and understanding of the basic concepts of microwave and its components.

To make students aware about the working and behavior of microwave vacuum tube devices and microwave solid state devices.

To provide knowledge about the microwave strip lines, microwave integrated circuits fabrication process and microwave measurements.

To make students aware about applications and hazards of microwave radiations

Prerequisite: Basic knowledge of EM field, transmission lines and Analog electronics

COURSE CONTENTS

UNIT-I

Microwave fundamentals – microwave frequencies, microwave devices, microwave systems, microwave units of measure, Scattering or S – matrix representation of multiport network, microwave waveguides, microwave cavities. Microwave hybrid circuit, waveguide tees, directional couplers, circulators and isolators.

UNIT-II

Microwave Vacuum Tube Devices – Limitations of conventional vacuum tubes in the microwave frequency range, Klystron amplifier, reflex klystron oscillator, travelling wave tube, Magnetron oscillator.

UNIT-III

Microwave semiconductor devices – microwave tunnel diode with its principles of operation and characteristics, Gunn-effect diodes, LSA diodes, Read diode, IMPATT, TRAPATT, BARITT diodes, parametric devices, parametric amplifiers.

UNIT-IV

Strip lines, monolithic microwave integrated circuits (MMIC) and microwave measurements- microstrip lines, parallel strip lines, coplanar strip lines, shielded strip lines, MMIC materials, MMIC growth, MOSFET fabrication, microwave test bench, power measurement, insertion loss and attenuation measurements, VSWR measurements, return loss measurement by reflectometer, impedance measurement, frequency measurement.

UNIT-V

Application, hazards and some advance topics - Applications of microwave, microwave radiation hazards, introduction to millimeter waves and its applications, design and implementation of microwave and millimeter wave circuits and systems

Learning Outcome:

After learning the course the students should be able to:

Understand the basic concepts of microwave and its devices and components.

Apply the knowledge of microwave to solve the microwave communication and microwave application based problems.

Apply this knowledge for research in the field of microwave engineering.

BOOKS RECOMMENDED:

- Samuel Y. Liao, *Microwave devices and circuits*, Third Edition, Pearson, 2003
- Annapurna Das and S K Das, *Microwave Engineering*, Third Edition, McGraw Hill, 2015
- R.E.Collin, *Foundations for Microwave Engineering*, 2/e, IEEE Press 2002
- David M.Pozar, *Microwave Engineering*, 2/e, John Wiley & Sons 2003
- P.A.Rizzi, *Microwave Engineering- Passive circuits* - PHI

List of Practical Assignments:

- Learn how to operate microwave test bench.
- To study the characteristics of the Reflex Klystron Tube and to determine its electronic tuning range.
- To plot different Modes of the Reflex Klystron Tube.
- To study V-I characteristics of Gunn diode.
- To determine the different parameters of Isolators and Circulators.
- To measure attenuation.
- Measurement of scattering parameters of Magic Tee.
- To Measure main-line and auxiliary-line VSWR, coupling factor and directivity of a multi-hole directional coupler.
- Measurement of guide wavelength.
- To plot directional pattern of horn antenna.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7E1	L	T	P	L	T	P	Total
CIRCUIT DESIGN USING HDL	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL. Perform synthesis, place, and route of a digital design into a target FPGA.

Prerequisite: Digital Design, C language.

COURSE CONTENTS

Unit I Introduction to VLSI and HDL

History of IC Design, IC Technology, Moore's Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic- Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski's Y Chart.

Digital system design process, Hardware simulation, Levels of abstraction, VHDL requirements, Elements of VHDL Top down design, VHDL basic language Elements, VHDL operators, Timing, Concurrency, Objects and classes.

Unit II Behavioural Modeling

Signal assignments ,Concurrent and sequential assignments., Entity Declaration, Architecture Body, Behavioral Modeling, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers.

Unit III Dataflow and Structural Modeling Techniques

Data flow Modeling, Concurrent Assignment statements, Block statements, Structural Modeling, Component declaration and Instantiation, Generate statements.

Unit IV Advance Topics in VHDL

Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Attributes.

Unit V Design for Synthesis

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints, Synthesis for dataflow and structural models.

Learning Outcomes:

At the end of the course, the students would be:

Able to design digital systems through HDL language Simulation, synthesis and implementation of HDL code Implementation of code on FPGA/CPLD

BOOKS RECOMMENDED:

- Bhasker, *VHDL Primer*, 3/e, Addison Wesley, 1999.
- Sudhakar Yalamanchili, *Introductory VHDL-From Simulation to Synthesis*, Pearson
- Douglas Perry, *VHDL*, 3/e Edition, McGraw Hill 2001.
- Peter.J.Ashenden, *The Designer's Guide to VHDL-AMS*,
- Charles.H.Roth, *Digital system Design using VHDL*, Thompson Publishers, 2/e Edition, 2007.
- Ben Cohen, *VHDL-Coding style and Methodologies*, Kluwer academic Publishers, 1995.
- Volnei. A.Pedroni, *Circuit Design with VHDL*, MIT Press Cambridge, 2004.

List of Practical Assignments:

VHDL Programming using Xilinx ISE

Note: For Q1 to Q5 use behavioral modeling. For Q6 to Q7 use data flow modeling and for Q8 to Q10 use structural modeling.

Q.1 Write a VHDL code for a Full Adder.

Q.2 Write a VHDL code for 8X1 Multiplexer using if-elseif statement, case statement and nested if statement and compare their delay and area.

Q.3 Write a VHDL code for a 3X8 decoder using case statement.

Q.4 Write a VHDL code for a J-K flip-flop triggered at falling edge of clock pulse. Also include clear and reset pins synchronized with clock pulse.

Q.5 Write VHDL code for a synchronous 3-bit binary up-down counter. Include a selection line for selecting the mode of counting upwards or downwards.

Q.6 Design a combinational circuit with three inputs x, y, and z and three outputs A,B and C. when the binary input is 0,1,2, or 3 the binary output is one greater than the input otherwise the binary output is one less than the input.

Q.7 Write a VHDL code for a 3-bit binary code to 3-bit grey code conversion.

Q.8 Design a 4-bit ripple counter using T-Flip flop as basic component.

Q.9 Design a 4-bit Magnitude comparator using 1-bit Magnitude comparator as basic entity.

Q.10 Design a circuit of a 3-bit parity generator and the circuit of a 4-bit parity checker using an odd parity bit.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7E2	L	T	P	L	T	P	Total
WIRELESS ADHOC AND SENSOR NETWORKS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the basics of Ad-hoc & Sensor Networks.
- To learn various fundamental and emerging protocols of all layers.
- To study about the issues pertaining to major obstacles in establishment and efficient management of Ad-hoc and sensor networks.
- To understand the nature and applications of Ad-hoc and sensor networks.
- To understand various security practices and protocols of Ad-hoc and Sensor Networks.

Prerequisite: Computer networking concepts

COURSE CONTENTS

UNIT I -MAC & TCP IN AD HOC NETWORKS

Fundamentals of WLANs, IEEE 802.11 Architecture, Self-configuration and Auto configuration, Issues in Ad-Hoc Wireless Networks, MAC Protocols for Ad-Hoc Wireless Networks, Contention Based Protocols -TCP over Ad-Hoc networks, TCP protocol overview-TCP and MANETs, solutions for TCP over Ad-Hoc Networks.

UNIT II-ROUTING IN AD HOC NETWORKS

Routing in Ad-Hoc Networks, Introduction, Topology based versus Position based Approaches, Proactive, Reactive, Hybrid Routing Approach, Principles and issues ,Location services ,DREAM ,Quorums based location service, Grid-Forwarding strategies, Greedy packet forwarding ,Restricted directional flooding, Hierarchical Routing, Issues and Challenges in providing QoS.

UNIT III-MAC, ROUTING & QOS IN WIRELESS SENSOR NETWORKS

Introduction, Architecture, Single node architecture, Sensor network design considerations ,Energy Efficient Design principles for WSNs, Protocols for WSN, Physical Layer : Transceiver Design considerations, MAC Layer Protocols ,IEEE802.15.4 Zigbee, Link Layer and Error Control issues-Routing Protocols, Mobile Nodes and Mobile Robots, Data Centric & Contention , Based Networking ,Transport Protocols & QOS, Congestion Control issues ,Application Layer support.

UNIT IV -SENSOR MANAGEMENT

Sensor Management, Topology Control Protocols and Sensing Mode Selection Protocols, Time synchronization, Localization and positioning, Operating systems and Sensor Network programming, Sensor Network Simulators.

UNIT V -SECURITY IN AD HOC AND SENSOR NETWORKS

Security in Ad-Hoc and Sensor networks, Key Distribution and Management, Software based Anti-tamper techniques, water marking techniques, Defence against routing attacks, Secure Ad-hoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba, Sensor Network Security Protocols, SPINS.

Learning Outcomes:

At the end of this course, students will be able to:

- Identify different issues in wireless ad hoc and sensor networks.
- To analyze protocols developed for ad hoc and sensor networks.
- To identify and address the security threats in ad hoc and sensor networks.
- Establish a Sensor network environment for different type of applications.

BOOKS RECOMMENDED:

- Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
- Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.
- C.Siva Ram,Murthy and B.S.Manoj, "Ad Hoc Wireless Networks–Architectures and Protocols", Pearson Education, 2004.
- C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2002.
- Erdal Çayırıcı , Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009.

List of Practical Assignments:

Practical based on open source Sensor network Simulator.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics and Telecommunicatio)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7E3 EMBEDDED SYSTEM	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

The goal of the course is to teach the concepts C Language and object oriented programming, PIC architecture and peripheral interfacing.

To read and understand the C and C++ programming, PIC microcontroller architecture and programming and RTOS.

The course focuses on how to write program and peripheral interfacing of PIC microcontroller and develop the applications.

Prerequisite: Knowledge of C language, Computer architecture and Microcontroller.

COURSE CONTENTS

UNIT I -Introduction to Embedded systems: Embedded systems, processor embedded into a system, embedded hardware units and devices in a system, embedded software in a system, examples of embedded systems, embedded SOC and use of VLSI circuit design technology, Complex systems design and processors, Design process in embedded system, formalization of system design, design process and design examples, classification of embedded systems, skills required for an embedded system designer.

UNIT II-PIC Microcontrollers: PIC 16 Series family overview, an architecture overview of the 16F84A, Status register, 16F84A memory, Some issues of timing, Power-up and Reset, PIC 16F84A parallel ports, 16F84A clock oscillator, 16F84A operating conditions, 16F84A interrupt structure.

UNIT III-Larger systems and the PIC 16F873A:The main idea –the PIC 16F87XA, The 16F873A block diagram and CPU, 16F873A memory and memory maps, 16F873A interrupts, 16F873A oscillator, reset and power supply, 16F873A parallel ports.

UNIT IV-RTOS: Basic design using RTOS, Micro/OS-II and Vxworks, windows CE, OSEK, real-time Linux functions,

UNIT V- Case study: Digital camera hardware and software architecture, embedded systems in automobile, embedded system for a smart card, mobile phone software for key inputs.

Learning Outcome:

- After learning the course the students should be able to
- Understand the fundamentals of embedded systems
- Understanding of C and basics of C Understand the OOP concepts of classes, objects, methods, constructors, destructors in C++
- Understand the microcontroller architecture (PIC)
- Understand and able to write the assemble language program.
- Understand and able to write the I/O and timers/counter programming

BOOKS RECOMMENDED:

- Embedded Systems Architecture Programming and Design by Raj Kamal, II edition, Tata McGraw-Hill.
- Designing Embedded Systems with PIC Microcontroller s: principles and applications by Tim Wilmshurst, Elsevier.
- Embedded Systems Design by Steve Heath, II edition, Newnes publications
- Embedded Systems Architecture: A Comprehensive Guide for Engineers and
- Programmers by Tammy Noergaard, Elsevier

List of Practical Assignments:

Practical based on PIC Microcontroller programming, it's interfacing with different peripherals and communication to other systems.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7E4	L	T	P	L	T	P	Total
INDUSTRIAL COMMUNICATION	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce the basic principles of networking
- To learn industrial protocols and the way of data processed and transferred in industrial network
- To equip the students with the relevant knowledge to understand and solve technical problems in Industrial Automation systems.

Prerequisites: Digital Communications

COURSE CONTENTS

UNIT I-Fundamental of Industrial Data Communication Systems:

Review of Data Acquisition, Automation System Architecture - Hierarchical Levels, Functional Layered Models - OSI reference model, System engineering approach, Input / Output Structures, Control Unit Structure, Protocols, Communication principles and modes: network topology, transmission media, noise, cable characteristic and selection; bridges, routers and gateways, Instrumentation and control devices.

UNIT II-Industrial Communication Standards and Protocols:

Serial communication standards: Standards organizations, Serial data communication interface standards, Balanced and unbalanced transmission lines, Synchronous and asynchronous communication, RS 232,422,485 standards.

Industrial protocols: XON/OFF Signaling, Binary Synchronous Protocol (BSC), HDLC/SDLC protocol, CSMA/CD, CA protocol, OSI implementation for Industrial communications, Industrial control applications: ASCCII-based protocol – ANSI –X 3.28 -2.5.

UNIT III-HART Communication Protocol Architecture:

Physical, data link, application layer, communication technique, normal and burst mode of communication, benefits of HART.

UNIT IV- Open industrial Fieldbus and DeviceNet systems:

Industrial Ethernet: 10Mbps, 100Mbps Ethernet, Gigabit Ethernet, Industrial Ethernet.

Foundation fieldbus: Fieldbus requirement, features, advantages, fieldbus components, types, architecture–physical, data link, application layer, system and network management, wiring, segment functionality checking, function block application process.

PROFIBUS: Architecture, OSI-model, PROFIBUS types – PA, DP & FMS and their comparison, Designing PROFIBUS, Network design, Advantages and Applications of PROFIBUS in industries.

UNIT V-Programmable Logic Controller:

PLC Controller operation, Architecture, topology, SCADA integration PLC as RTU, Batch and sequential processing, Ladder diagram

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Identify the need for network protocols during data exchange
- Demonstrate the use of serial standards as required in an industrial plant environment.
- Analyze and identify the methods of communications
- Compare the different protocols used as industrial standards
- Demonstrate a working programmable logic controller network in a simulated industrial automated application.

BOOKS RECOMMENDED:

- John Park, Steve Mackay, Edwin Wright, *Practical Data Communications for Instrumentations and Control*, 1st Edition ELSEVIER, 2003.
- Deon Reynders, Steve Mackay, Edwin Wright, *Practical Industrial Data Communications*, 1st Edition ELSEVIER, 2005.
- William C. Dunn, *Fundamental of industrial instrumentation and process control*, Mc Graw-Hill, 2005.
- Behrouz A. Forouzan, *Data Communications and Networking*, 2nd Edition, Mc Grow – Hill, 2001.

List of Practical Assignments:

- To study Amplitude Modulation and Frequency Modulation.
- To study and simulate Pulse Width Modulation.
- To study digital communication using ASK, FSK and PSK.
- To study RS-232, RS-485 and RJ-45 communication standards.
- To study types of Cables and Interference.
- To study Modbus Protocol.
- To study HART Protocol.
- To study CANBUS, Device Net and SDS system.
- To study network topologies and Ethernet.
- To study mobile communication and satellite communication

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7E5 SPEECH AND IMAGE PROCESSING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: Student will learn basic principles and used processes speech, images and videos, and how to apply them in solving practical problems of commercial and scientific interests.

Prerequisites: Signals and systems, Digital signal processing

COURSE CONTENTS

UNIT I- Digital Speech Processing

The Fundamentals of Digital Speech Processing. A Review of Discrete -Time Signal & Systems , the Z-transform, the DFT, Fundamental of Digital Filters, FIR system, IIR Systems. Time–Domain Methods for Speech Processing. Time-Dependent Processing of speech, short -time energy and Average Magnitude, Short time Average Zero-Crossing Rate. Digital Representation of speech Waveform Sampling speech signals, statistical model, Instantaneous quantization, Instantaneous companding, quantization for optimum SNR, Adaptive quantization, Feed-forward Feedback adaptations.

UNIT II- Linear Predictive Coding of Speech

Block diagram of Simplified Model for Speech Production. Basic Principles of Linear Predictive Analysis-The Auto Correlation Method. The Prediction Error Signal. Digital Speech Processing for Man-Machine Communication by voice. Speaker Recognition Systems-Speaker verification and Speaker Identification Systems

UNIT III-Digital Image

Different stages of Image processing & Analysis Scheme. Components of Image Processing system, Multiprocessor Interconnections. A review of various Mathematical Transforms. Image Formation: Geometric Model, Photometric Model. Image Digitization: A review of Sampling and quantization processes. A digital image.

UNIT IV- Image Processing

Image Enhancement: Contrast Intensification, Smoothing, Image sharpening. Restoration: Minimum Mean –Square Error Restoration by Homomorphic Filtering. Image Compression: Schematic diagram of Data Compression Procedure, Lossless compression–coding. Multivalued Image Processing, Multispectral Image Processing, Processing of colour images

UNIT V- Case study on Speech and Image Processing

Learning Outcomes:

Upon Completing the Course, Student will able to:

- learn the theory behind fundamental processing tasks including image/video enhancement, recovery, and compression.
- learn how to perform these key processing tasks in practice using state-of-the-art techniques and tools like optimization toolboxes to statistical techniques.

BOOKS RECOMMENDED:

- Milan Sonya, Vaclav Hlavac & Roger Boyle, “Image Processing Analysis and Machine Vision”, Vikas Publishing House
- A.K. Jain, “Digital Image Processing”, Pearson Education
- Chanda, B. & Majumder, D. D, “Digital Image Processing & Analysis” , Prentice Hall (India)

List of Practical Assignments:

Practical based on Texas Instruments DSP Processor kit, it’s interfacing with different peripherals and communication to other systems.

**B. E. IV YEAR CIVIL ENGINEERING (CBCS) L -Lecture, T – Tutorial, P – Practical, PC-
Programme core, PE-Programme Elective, CBCS-Choice based credit system**

Semester-VII

S No	Subject Code	Subject Name	Type	L-T-P	Credits
1.	VLR7P1	Project Phase - I	--	0-0-7	7
2.	VLR7C1	Transportation Engineering – II	PC	3-1-1	4+1(P)
3.	VLR7C2	Design of Steel Structures – II	PC	3-1-1	4+1(P)
4.	VLR7EX	--	PE	3-1-1	4+1(P)
5.	VLR7G5	Structural Analysis – II	GE	3-1-0	4
6.	VLR7V7	Comprehensive Viva - VII	Virtual	0-0-4	4
TOTAL CREDITS					30
Programme Electives for VII Semester					
1	VLR7E1	Environmental Engineering – II	PE	3-1-1	4+1(P)
2.	VLR7E2	Air pollution control and Management	PE	3-1-1	4+1(P)
3.	VLR7E3	Municipal solid waste Management MANAGEMENT ASSESSMENT techniques	PE	3-1-1	4+1(P)
4.	VLR7E4	Systems engineering for civil engineers (Training to be undergone after VI semester) structures	PE	3-1-1	4+1(P)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR7C1 Transportation Engineering -II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	4+1

Objective of the subject:

To know about various pavement materials.

To know about procedure of designing pavements

To know about method of construction of different pavements.

To know about traffic principles

COURSE CONTENTS

Unit I: Pavement Materials and Mix Design: Subgrade soil properties, CBR test, aggregates, desirable properties, tests, bituminous materials, bitumen and tar, tests. Bituminous mixes, requirements, design, Marshall Method. pavements.

Unit II: Design of Pavements: Types of pavement structures, functions of pavement components, design factors. Design of flexible pavements, methods, GI method, CBR method, IRC method, Burmister's method. Design of rigid pavements, design considerations, wheel load stresses, temperature stresses, frictional stresses, design of joints, IRC method of rigid pavement design.

Unit III:

Highway Construction : Types of highway construction, construction of earth roads, gravel roads, WBM roads. Bituminous pavements, types, surface dressing, penetration macadam, built up spray grout, bitumen bound macadam, bituminous carpet, bituminous concrete. Cement concrete, Pavement failures, causes, failures in flexible pavements and rigid pavements.

Unit IV: Traffic Engineering Principles: Traffic characteristics; components of traffic stream: flow-speed Density, measurement and analysis, q-k-v relationships, design hourly volume, concept of EPCU, capacity and level of service. Parking studies and accident studies. Design of intersections, at grade intersections, channelized and rotary. Introduction to grade separated intersections, cloverleaf, trumpet, flyovers. Traffic regulations, one-way streets, traffic signs, road markings, signals, warrants.

UNIT V: Airport Planning, Runway & Taxiway: Airport site selection, air craft characteristic and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports.

Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.

REFERENCES

- Khana .S.K, Justo .C.E.G – “Highway Engineering,” Nemchand & Bros, Rookies. 2001.
- Chakroborty, P. and A. Das Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd, New Delhi, India, 2005.
- Rangwala SC; Railway Engineering; Charotar Publication House, Anand
- Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
- Kadiyali .L.R, “Traffic Engineering And Transport Planning”, Khanna publishers, Delhi,2009.
- Ministry of Road Transport and Highways. Specifications for Road and Bridge Works, Fourth Edition, Indian Roads Congress, New Delhi, India, 2001.
- IRC Codes of Practices
- Jotin Khisty C. and B. Kent Lall. Transportation Engineering – An Introduction, Third Edition. Prentice Hall of India Pvt. Ltd, New Delhi, India, 2002.
- Rao G.V. Principles of Transportation and Highway Engineering, Tata McGraw-Hill Publishing Company Ltd., New Delhi, India, 1996.
- McShane, W.R. and R.P. Roess Traffic Engineering, Prentice Hall, New Jersey, USA, 1990.

Course Outcomes: At the end of the course, the student will be able to:

- Design Intersections and prepare traffic management plans.
- Design flexible and rigid pavements.
- Understand the principles of construction and maintenance of highways
- Estimate basic characteristics of traffic stream
- Conduct traffic studies and analyze traffic data

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR7C2 Design Of Steel Structure -II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	4+1

COURSE CONTENTS

Unit I: Plate Girders

Necessity of plate girders- equivalent uniformly distributed load – design of welded plate girders – intermediate stiffeners – vertical and horizontal – bearing stiffeners

Unit – II

Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

Unit – III

Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

Unit - IV

Guyed and self supporting steel stacks (Chimneys). Bunkers, Silos

Unit – V

Transmission line towers : Introduction, types of towers, tower configuration, load analysis and design of members.

Reference Books :-

- Design of Steel Structures , Ramammutham
- Design of Steel Structures Punmia B.C
- Design of Steel Structures, Ramchandra Vol II
- Design of Steel Structures, Arya and Azmani
- Design of steel structures, L.S. Negi

Course Outcomes:

At the end of the course, the student will be able to:

- Design steel gantry girders
- Design railway and highway trussed bridges
- Design storage structures water tank, bunkers and silos
- Design chimney and towers

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR7E1 Environmental Engineering -II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	4+1

COURSE CONTENTS

Unit I : Sewage And Sewerage Engineering

Definition & Classification of Sewage - Quantity of Sanitary Sewage and Storm Water – Fluctuations in Flow Pattern – Design Flow of Sewage – Physio-chemical and Biological Characteristics – Assessment of Organic Solids by BOD, COD, TOC, ThOD, & TOD – Microbiology of Sewage – Systems and Layouts of Sewerage – Analysis and Design of Sewers under Different Flow Situations - Sewer Sections – Materials for Sewers – Laying, Jointing, and Testing of Sewers – Appurtenances and Maintenance - Pumping of Sewage and Pumping Stations.

Unit II : Preliminary And Primary Treatments Of Sewage

Principles and Objectives of Sewage Treatment – Operation and Design of Bar Rack and Grit Chamber with Velocity Control Devices – Principles of Primary Treatment and Design of Primary Sedimentation Tank – Disposal of Rackings, Gritty Materials, and Sludge Solids.

Unit III : Biological Treatment Processes

Objectives of Biological Treatment – Path Ways of Decomposition – Aerobic, Anaerobic, and Anoxic Processes – Operation & Design of Conventional Activated Sludge Process with Diffuser and Mechanical Aerators – Process Modifications – Analysis and Design of Trickling Filter – High rate and Standard Rate Filters – Low Cost Waste Water Treatments – Principles and Design of Stabilization Ponds, Oxidation Ponds and Aerated Lagoons – Rural Sanitation – Operation and Design of Septic and Imhoff Tanks – Excreta Disposal Schemes.

Unit IV : Engineering Methods Of Sludge Disposal

Objectives of Sludge Disposal – Types and Characteristics of Sludges in a Typical Treatment Plant – Operation and Design of Sludge Digestions – Energy Recovery Aspects regarding Methane Production – Sludge Lagooning, Unconventional Methods of Disposal - Disposal of Sewage by Dilution in Streams, Rivers, and Estuaries – Self-purification and Oxygen Sag-curve Analysis – Trophic Status of Aquatic Bodies.

Unit V : Advanced Waste Water treatment

Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil

Reference Books :-

- Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company
- Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
- Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
- Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company
- Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
- Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Civil Engineering)				
Subject Code & Name	Instructions Hours per Week			Credits			
VLR7G5 Structural Analysis-II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	4+1

COURSE CONTENTS

Unit I : Force Method : Consistent Deformation Method – General Concept – Application to Truss subjected to Loads – Application of Clapeyron’s Theorem of Three Moments to fixed and continuous beams

– Temperature, Lack of fit, Settlement of Support – effects in structures

Unit II : Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.

Unit III : Matrix Methods of Structural Analysis: Basic structural principles. static and kinematics indeterminacies of a structure .flexibility and stiffness matrices, flexibility and stiffness influence coefficients .

Matrix Force (Flexibility) Method : Basic principles - choice of redundants - released structure - application of fixed beams, continuous beams and portal frame upto two degree static indeterminacy.

Matrix Displacement (Stiffness) Method: Concept of stiffness method - restrained structure - applications to continuous beams and portal frames upto two degree of kinematic indeterminacy.

Unit IV : Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns. Plastic analysis of beams and frames.

Unit V : Introduction to Structural Dynamics

Free Vibration damped - undamped vibrations for Single degree of freedom system - Forced vibration - displacement and force isolation.

Reference Books :-

- Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
- Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
- Reddy C.S., Basic Stgstructural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
- Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi

- Junarkar. S. B and Shah H.J- Mechanics of Structures Vol 1 & Vol.2 – 27th Edition, Charotar Publishers, 2008.
- Mario Paz, Structural Dynamics-Theory and Computation, 2nd Edition, CBS Publishers, 2010.

**B.E Part Time Scheme & Syllabus
Mechanical Engineering VIIIth sem**

**COURSE SCHEME FOR B.E IV YEAR-PART TIME (CBCS)
MECHANICAL ENGINEERING DEPARTMENT**

Semester-VII

S.N	Sub_code	Sub_Name	Type	L-T-P	Credits
1	MEP7C1	MACHINE DESIGN III	PC	2-1-0	3
2	MEP7C2	REFRIGERATION & AIR CONDITIONING	PC	2-1-1	3+1(P)
3	MEP7EX	--	PE	2-1-1	3+1(P)
4	MEP7P1	PROJECT PHASE I	PC	0-0-4	4
5	MEP7V7	COMPREHENSIVE VIVA -VII	VIRTU AL	0-0-4	4
TOTAL CREDITS					15(A)+4(V)

List of Elective – I

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	MEP7E1	AUTOMOBILE ENGINEERING	PE	2-1-1	3+1(P)
2.	MEP7E2	SQC & TQM	PE	2-1-1	3+1(P)
3.	MEP7E3	ROBOTICS	PE	2-1-1	3+1(P)
4.	MEP7E4	TRIBOLOGY	PE	2-1-1	3+1(P)

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP7C1	L	T	P	L	T	P	Total
Machine Design III	2	1	0	2	1	0	3
Duration of Theory Paper:							
4 Hours							

Learning Objectives:

- The objective of the subject to introduce the students about the new and advanced methods of design like optimization in design.
- The objective of the subject to introduce the students about the new and advanced methods of design like reliability based design,
- The objective of the subject to introduce the students about the new and advanced methods of design like high temperature resistance part design etc.
- The objective of the subject to introduce the students about design of Journal Bearing and selection of Anti frictional Bearings from manufacturing catalogues.

Pre requisite(s): Machine Design I, Machine Design II.

COURSE CONTENTS

UNIT-I

Design for Bearings: Introduction about different types of bearings, Design for Journal bearing: Specifying bearing modulus, minimum oil film thickness, flow of oil, bearing heat balancing. Elementary treatment of contact stress, Selection of antifriction bearings.

UNIT-II

Reliability and Optimum based Design: Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability, System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

UNIT-III

Design for Tool Drive: Design of machine tool drives such as lathe, drilling and milling machine, speed diagram, ray diagram, preferred number.

UNIT-IV

Design for Creep: Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

UNIT-V

Design for Un-symmetrical Bending: Design of parts of unsymmetrical sections, shear center, parts subjected to unsymmetrical bending. **Note:** Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Learning Outcomes:

Upon completing the course, student will be able to:

- Design the machine components on the basis of Reliability.
- Optimize the mechanical component design.
- Design the component under high temperature condition.
- Determine the arrangement and layout for tool drive design.
- Evaluate and Design the Unsymmetrical component subjected to loading condition.

BOOKS RECOMMENDED:

- Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill ,4e,2003.
- Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006.
- Sharma P.C. and Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2006.
- Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications(P) Ltd., 3e, 1995.
- Maleev V.L., *I.C. Engine Design*, , Mc.Graw Hill ,1e, 1945.
- Black and Adams, *Machine Design*, Mc.Graw Hill, 2e, 1968.
- Mubeen A., *Machine Design*, Khanna Publishers, 4e, 2005.

LIST OF PRACTICAL ASSIGNMENTS

- Problem on Design of Journal Bearing.
- Problem on selection of Antifriction Bearing.
- Problem on Reliability based design.
- Problem on Dimensioning of parts.
- Problem on Optimum based design.
- Problem on Design for Tool Drive.
- Problem on Design for creep.
- Problem on Design for Un-symmetrical Bending.

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP7C2 REFRIGERATION AND AIR- CONDITIONING	L	T	P	L	T	P	Total
	2	1	1	2	1	1	4
Duration of Theory Paper:							
3 Hours							

Learning Objectives:

1. Realise the importance of science of Refrigeration and Air-Conditioning.
2. Understand the different Refrigeration and Air-Conditioning systems.
3. Able to apply the learning outcomes of prerequisites for design and selection of Refrigeration and Air-Conditioning systems for specific applications.
4. Learn latest trends in Refrigeration and Air-Conditioning.

Prerequisite(s): Applied Mathematics I/II/III/IV, Engineering Thermodynamics, Fluid Mechanics, Thermal Engineering, Heat Transfer.

COURSE CONTENTS

UNIT -I

Introduction and Air Refrigeration Systems: Introduction: Review of reversed Carnot Cycle, Coefficient of Performance, Types of Refrigeration Systems, Bell-Coleman cycle, Air-Refrigeration Cycles, systems for aircraft, Boot-strap type and simple evaporative systems, Applications of refrigeration systems

UNIT -II

Vapour Compression Refrigeration (VCR) Systems: Thermodynamic Cycle, T-s and P-h diagrams, Components and types: Compressor, Condenser, Expansion device and Evaporator, Analysis, effect of under-cooling and suction superheat, Limitations of VCR systems; Refrigerants: Classification, Properties and nomenclature, primary and secondary refrigerants, eco-friendly Refrigerants.

UNIT-III

Unconventional Refrigeration Systems and Future Trends: Vapor Absorption Systems: absorption cycle, Lithium-bromide system, heat-exchangers, analyzer and diffusers; The Electrolux system; Steam-Jet Refrigeration, Thermo-Electric Refrigeration. Low-temperature refrigeration: Cascade systems, Joule-Thompson effect, liquefaction of gases, application areas.

UNIT -IV

Psychrometry and Load Estimation: Psychrometry: Psychrometers, Terminology, Psychrometric Chart, Psychrometric properties and Processes, Apparatus Dew Point (ADP), By-pass factor; Thermal Comfort: metabolism and heat exchange by the human body, comfort charts, Current ASHRAE Standards; Air-conditioning Load Estimation: Heat Transfer fundamentals; Cooling and heating load estimation, Heat transfer across the building envelope, thermal insulation; Solar Heat Gain, ventilation and infiltration. Sensible heat factors: Room Sensible Heat Gain Factor (RSHF), Grand Sensible Heat Gain Factor (GSHF) Effective Room Sensible Heat Gain Factor (ERSHF) lines

UNIT -V:

Air Conditioning Systems: Air conditioning Systems: Basic Components, Types and selection, Air Systems, Water Systems, Room Air Conditioners – Window Type, Package Type, Split Type, Central Units. Air Supply Systems: Fans and Blowers, performance characteristics, heating and cooling coils, Flow through Ducts, Losses, Duct Design Methods. Air Distribution and control Devices.

Note: Refrigerant tables, Refrigeration and Air-conditioning Data Book and certified data tables are allowed in the examination hall.

Learning Outcomes:

- Upon Completing the Course, Student will able to:
- Understand the design and working principles of Refrigeration and Air-Conditioning systems.
- Select Refrigeration and Air-Conditioning system components.
- Learn advance subjects of Refrigeration and Air-Conditioning .
- Industry ready for Refrigeration and Air-Conditioning industry.

BOOKS RECOMMENDED

- Stoeker and Jones, Refrigeration and Air-conditioning, McGraw-Hill Co, 2008.
- Arora C.P., Refrigeration and Air-conditioning, TataMcGraw Hill, 2008.
- Prasad M, Refrigeration and Air-conditioning. New Age Publishers, 9e, 2008.
- Ameen Ahmadul, Refrigeration and AirConditioning, Prentice-Hall of India, 2006.
- Arora R. C., Refrigeration and Air-conditioning, TataMcGraw Hill, 2008.

LIST OF PRACTICAL ASSIGNMENT

- To find the coefficient of performance of Vapour compression Refrigeration (VCR) system.
 - To find the Refrigeration effect of Vapour compression Refrigeration (VCR) system.
 - To find coefficient of performance of Air-conditioner Trainer system.
 - To find Refrigeration effect of Air-conditioner Trainer system.
 - To find various Psychrometric properties of Air.
 - To find the Refrigeration effect of Vapour Absorption Refrigeration (VAR) system.
 - Estimate cooling load of a building envelop.
 - To prove the relation between the coefficient of performance of a Heat Pump and a Refrigerator.
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Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)				
Institute of Engineering & Technology				(Part Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
MEP7E1		L	T	P	L	T	P	Total
AUTOMOBILE ENGINEERING		2	1	1	2	1	1	4
Duration of Theory Paper:		3 Hours						

Learning Objectives:

- To understand the principles and working of different systems of automobiles.
- To understand the principles and design of different systems of automobiles.
- To understand the principles and working of Microprocessor based automobiles.
- To understand the principles and working of Electrical systems of automobiles.

Pre requisite(s): IC Engines, Theory of Machines, Dynamics of Machines, Engineering Mechanics.

COURSE CONTENTS

UNIT-I

Chassis and Body Engineering: Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Chassis layout, layout of an automobile with reference to engine location, stability of vehicles, structural dynamics, Performance of Vehicle, types of automobiles.

UNIT-II

Steering System: Front axle beam, Stub axle, Front wheel assembly, Principles of types of wheel alignment, Front wheel geometry viz. camber, Kingpin inclination, Castor, Toe-in and Toe-out, Condition for true rolling motion, Centre point steering, Directional stability of vehicles, Steering Gears, Power steering, Slip angle, Cornering power, Over steer & Under Steer, electronic steering control, Wheels and tyres Specifications, Types, Construction and tread pattern.

UNIT-III

Suspension System: Vehicle Dynamics and requirement of suspension, Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, electronic suspension system, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, Antilock braking system, Performance- Braking efforts, Efficiency, Stopping Distance & time, traction control system,

UNIT-IV

Transmission System: Clutches-requirement, Types and construction, Various Resistances to Motion of Automobile, Traction, tractive effort Performance curves, Need for transmissions, Types and construction, Synchronizer, Gear shifter mechanism, Determination of gear ratio for vehicles, Gear box performance at different vehicle speed, Torque converters, Fluid coupling, Automatic transmission, epicyclic and hydromatic transmission – continuously variable transmission (Continuous Variable Transmission – CVT), Electrical drives: advantages and limitations, Modern electric drive for buses and performance characteristics, Propeller shaft, Universal joints, CV joints, Differential gear box, Rear axle types & construction.

UNIT-V

Electrical and Control Systems: Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Different Bendix drive systems, Starter relay switch, Electrical accessories -fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Car air conditioning systems, Battery operated vehicles. Microprocessor based control system for automobiles. Intelligent automobiles control systems.

Indian standards for automotive vehicles exhaust emission-Bharat and Euro norms, Indian Motor vehicle act-preliminary information.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the design and working principles of Chassis systems of automobiles.
- Understand the specifications of automobiles.
- Understand the working of all systems of automobiles.
- Learn advanced system of automobiles.
- Industry ready for Automotive industry.

BOOKS RECOMMENDED:

- Singh Kirpal, *Automobile Engineering, Vol.1*, Standard Pub, 9e.
- Giri N.K., *Automotive Technology*, Khanna Pub, 4e 2009.
- Newton & Steeds, *Automobile Engineering*, Butterworth Int.
- Heitner Joseph, *Automotive Mechanics, Principles and Practices*, East-West Pub.
- Crouse W.H., *Automotive series Part-I to VI*, Tata McGrawhill, 9.e
- Crouse W.H., *Automotive Emission*, Tata McGrawhill.
- BIS and Euro –I and Euro-II, *Emission standards*.

LIST OF PRACTICAL ASSIGNMENTS:

- Study of chassis frame and body.
- Study by dismantling and assembly of steering linkage mechanism and Steering Boxes.
- Study by dismantling and assembly of Front and Rear suspension systems.
- Study by dismantling and assembly of hydraulic brake and power brake system.
- Study by dismantling and assembly of single plate and multi plate clutch system.
- Study by dismantling and assembly of sliding mesh, constant mesh, synchromesh gearboxes.
- Study by dismantling and assembly of -Propeller shaft, Differential, Rear axles.
- Study of electrical circuit, self-starter and battery.

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP7E2	L	T	P	L	T	P	Total
SQC & TQM	2	1	1	2	1	1	4
Duration of Theory Paper:							
3 Hours							

Learning Objectives:

- The objective of the subject to introduce concepts of quality & quality control.
- To impart the knowledge of Total Quality Management philosophy this is widely adopted by the business organizations now a day.
- This course will enable the students to apply the concepts of Quality in the industries & get benefited.

Pre requisite(s): Industrial Engineering & Management & Materials Management.

COURSE CONTENTS

UNIT- I

Basic concepts of quality: Meaning of Quality, Quality of Design, Quality of Conformance, quality of performance, Quality characteristic, Quality functions, Costs of Quality, Value of Quality, Quality control, Quality Control and inspection, Quality Policy, Objectives and organization, Quality Assurance. Statistical concept, Frequency distributions.

UNIT- II

Statistical quality control: Concepts of Variations Process capability, variables and attributes, Theory of Control chart, Control chart for variable-x bar & R chart, Application of control chart for variables. Patterns of control charts. Control Chart for Attributes: **P, np, C** and demerit control charts & their application.

UNIT- III

Acceptance sampling: Fundamental concepts, OC Curve-construction of OC curve, Evaluation of parameters affecting OC curve, sampling plans: Single, Double, Multiple & Sequential sampling plans. Selection of sampling plan.

UNIT- IV

Total quality management: Introduction to TQM :- Feature of TQM System, Application & Benefits of TQM. Objective of TQM, Scope & Approach of TQM, Key Activity Areas of TQM, Principles of TQM, Total Quality management philosophy of Deming, Juran & Philip Crosby. TQM Models – Models for TQM Implementations, Strategic tools & techniques of TQM.

UNIT- V

Reliability & iso 9000: Basic Concept of reliability, Reliability and Quality, failures and failures modes, Causes of failure and unreliability, Maintainability and availability. System reliability models- System with components in series. Systems with parallel components. Need for Quality system, History of ISO: 9000 series of standards, features of ISO: 9000 series of standards.

Learning Outcomes:

Upon completing the course, student will be able to:

- Understand the concept of Quality and basic statistical concepts.
- Preparation of Process control chart in the different industrial process.
- Understand the concepts of Acceptance Sampling.
- Apply the basics of Total Quality Management and its implementation.
- know the system reliability concept and ISO standards.

BOOKS RECOMMENDED:

- Kapur K.C. & Lamberson, *Reliability in Engg. Design*, Wiley Eastern.
- Grant E.L. & Leave Worth, *Statistical Quality Control*, Tata Macgrawhill.
- Juran and Gryan, *Quality Planning Analysis*, Tata Macgrawhill.
- Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons(P)Ltd, 3e, 2003.
- Sharma D. D., *Toatal Quality Management*, Sultan Chand & Sons, 2e,2004.
- Besterfield, *Toatal Quality Management*, Pearson Education, 3e,2005.

LIST OF PRACTICAL ASSIGNMENTS

- Study and Analysis of set parameters relating to different mathematical distributions(Variable).
 - Study and Analysis of set parameters relating to different mathematical distributions (Discrete).
 - Construction & analysis of various process control charts.
 - Performance of Acceptance Sampling for a given set of lots.
 - Analysis of tools of related to total Quality Management like QFD, Fish bone diagram etc.
 - Case studies related to Quality Problems.
 - Case studies related to Quality Control.
 - Case studies related to Quality Management.
-

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)				
Institute of Engineering & Technology				(Partl Time)				
Subject Code & Name		Instructions Hours per Week			Credits			
MEP7E3		L	T	P	L	T	P	Total
ROBOTICS		2	1	1	2	1	1	4
Duration of Theory Paper:								
3 Hours								

Learning Objectives:

- The main objective of the subject to introduce the students about the new and advanced methods to implement on design of Industrial robot.
- Objective of the subject to introduce the students about the new and advanced methods to implement on Industry Automation.
- Students will demonstrate an understanding of how to program robots and computers that control manufacturing automation.

Pre requisite(s): Theory of Machine, Dynamics of Machine.

COURSE CONTENTS

UNIT-I

Introduction: Automation and Robotics, CAD/CAM and Robotics, An over view of Robotics, Present and future applications, Classification by coordinate system and control system.

UNIT-II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom, Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-III

Robot Arm Kinematics: Direct and inverse kinematics, Rotation matrices, Composite rotation matrices, Euler angle representation , Homogenous transformation, Denavit Hattenberg representation and various arm configuration.

UNIT-IV

Robot Arm Dynamics: Lagrange – Euler formulation, joint velocities, Kinetic energy, Potential energy and motion equations, Generalised D'Alembert equations of motion.

UNIT-V

Application of Robotics: Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading- Processing, Spot and continuous arc welding & spray painting, Assembly and Inspection.

Learning Outcomes:

- Familiar with the history, concept development and key components of robotics technologies.
- Familiar with various robot sensors and their perception principles that enable a robot to analyse their environment, reason and take appropriate actions toward the given goal.
- Understand, analyse and solve problems in spatial coordinate representation and spatial transformation, robot locomotion design, kinematics, motion control.

BOOKS RECOMMENDED:

- Fu K. S., *Robotics (Control, Sensing, Vision and Intelligence)*, McGraw-Hill, 4e, 2003.
- Schilling R.J., *Fundamental of Robotics*, Prentice Hall, 1990.
- Wesley, Sryda E., *Industrial Robots: Computer interfacing and Control*, Prentice Hall, 1985.
- Groover M.P., *Industrial Robotics Technology Programming and Applications*, McGraw-Hill, 1986.
- Asada and Slotine, *Robot Analysis and Control*, John Wiley and Sons, 1986.

LIST OF PRACTICAL ASSIGNMENTS

- Assignment on introduction to robot configuration.
 - Demonstration of robot with 2 DOF, 3 DOF, 4 DOF etc.
 - Two assignments on programming the robot for applications.
 - Two assignments on programming the robot for applications in VAL II.
 - Two programming exercises for robots.
 - Two case studies of applications in industry.
 - Exercise on robotic simulation software.
-

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MEP7E4	L	T	P	L	T	P	Total
TRIBOLOGY	2	1	1	2	1	1	4
Duration of Theory Paper:							
3 Hours							

Learning Objectives:

- The basic objective of the subject is to deal fundamentals of friction, wear and lubrication.
- The subject is useful in understanding the nature of surfaces of engineering materials.
- The basic objective of the subject is to learn about types of lubricants.
- The subject is useful in understanding the various tribological applications.

Pre requisite(s): Material Science, Machine Design I & II.

COURSE CONTENTS

UNIT- I

Fundamentals of Tribology: Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques, statistical description.

UNIT- II

Friction of Surfaces: Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods, friction of non metallic materials.

UNIT- III

Wear Mechanism: Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-IV

Theory of Lubrication: Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Grease and anti seizes, gas

bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring, Additives in lubricants.

UNIT- V

Design for Tribological Elements: An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Basic Equation for fluid film lubrication Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication.

Learning Outcomes:

Upon completing the course, student will be able to:

- Understand and importance of Tribological phenomenon
- Optimize the friction and wear rate.
- Understand the wear mechanism.
- Determine the application of Lubricants.

BOOKS RECOMMENDED:

- Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975
- Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982
- Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999.

LIST OF PRACTICAL ASSIGNMENTS

- Performance analysis of Journal Bearings.
- Experimental analysis of Lubricants.
- Experimental analysis of Friction on different material.
- Study of method for Wear Debris analysis.
- Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing.

Devi Ahilya Vishwavidyalaya, Indore

Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 29/12/2018

Committee members discussed the Internship issue for students of BE 8th Semester. Following is decided;

1. Internship in 8th semester will be approved in following cases;

- a) Students who have been offered Internship from companies visited the Institute for campus placement.
- b) Students who have been offered internship from government organizations/ public sector undertaking.

In such cases application will be forwarded by T/P cell after ensuring placement offer and NOC will be issued by the Administrative Officer. Information about students going for internship will be given to the Departmental Committee.

2. Internship offered to any student other than above mentioned two cases will be decided by the Departmental Committee. Such applications will be kept with the T/P cell and put up for consideration to the Departmental Committee. NOC will be issued by the Administrative Officer after approval of the committee.

3. Records will be maintained in Administrative Office. Separate Roll list for Internship / Non-Internship will be generated by the Administrative Office.

4. The student opting for Internship will be offered two subjects from SWAYAM-NPTEL as decided by the Departmental committee. These two subjects for Internship for academic session 2018-19 have be decided for different branches by the Departmental committee (enclosed).

5. One faculty coordinator will be appointed for each subject offered through SWAYAM-NPTEL through Department/s.

6. For Internal assessment the student opting for SWAYAM-NPTEL course has to submit one assignment prepared by faculty coordinator (Date of submission will be around MST-2). Such student/s have to appear in one class test at the Institute. (Approximate date of class test will be around MST-3)

7. Two progress report of Internship in the semester will be taken from the mentor at the company for internal evaluation of the Project work during internship (equivalent to 40% credit). Final report of Internship will be submitted at the end of the semester by the student forwarded by the mentor at the company for final evaluation at the Institute (equivalent to 60% credit).

(Signature)

S.V. Zakeb
29.12.18

(Signature)

(Signature)

29/12/18

(Signature)

Meenal

8. Final Examination of the two courses opted through SWAYAM-NPTEL will be taken at the institute along with 8th semester examinations.
9. Departmental committee also passed syllabus for 8th semester of different BE Courses.
10. Due to elections in the forthcoming months, it is decided to conduct five lectures per subject per week for all subjects of different programmes.
11. Departmental Committee agreed to adopt the program outcomes of MSc. (Applied Maths) course being conducted at IET.
12. Program Specific outcomes for MSc. (Applied Maths), prepared by the department is adopted by the departmental committee of IET.



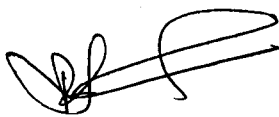
Dr. Paresh Atri



Dr. N. Sohoni



Dr. Mrs. M. Sharma



Dr. Ravi Sindal



Dr. Shashi Prakash

Dr. Vrinda. Tokekar

Dr. Ajay Verma

S. V. Tokekar
29.12.18
Dr. Sanjiv Tokekar

List of Courses to be offered through SWAYAM Portal for Students opting for Internship

S.No	Branch	Course Name	Start Date	End date	Enrollment End Date	Faculty Coordinator	Link
1	E&TC/E&I Engg.	Introduction to Photonics	28-01-2019	21-04-2019	04-02-2019	Dr. Shashi prakash	https://swayam.gov.in/courses/5439-jan-2019-introduction-to-photonics
2	E&TC/E&I Engg.	Cryptography and Network Security	28-01-2019	21-04-2019	27-02-2019	Dr. Uma Bhatt	https://swayam.gov.in/courses/5404-jan-2019-cryptography-and-network-security
3	E&TC/E&I Engg.	Introduction to Photonics	28-01-2019	21-04-2019	04-02-2019	Dr. Shashi prakash	https://swayam.gov.in/courses/5439-jan-2019-introduction-to-photonics
4	E&TC/E&I Engg.	Cryptography and Network Security	28-01-2019	21-04-2019	27-02-2019	Dr. Uma Bhatt	https://swayam.gov.in/courses/5404-jan-2019-cryptography-and-network-security
5	Civil Engg.	Theory and Practice of Non Destructive Testing	28-01-2019	24-03-2019	04-02-2019	Dr Pratosh Bansal	https://swayam.gov.in/courses/5515-jan-2019-theory-and-practice-of-non-destructive-testing
6	Civil Engg.	Earth Sciences for Civil Engineering Part - I & II	28-01-2019	24-03-2019	04-02-2019	Dr Pratosh Bansal	https://swayam.gov.in/courses/5377-jan-2019-earth-sciences-for-civil-engineering-part-i-ii
7	Mechanical Engg.	Product Design and Development	28/01/2019	24/02/2019	04/02/2019	Dr. Devendra Singh Verma/ Ms. Jyoti Soni	https://swayam.gov.in/courses/5537-jan-2019-product-design-and-development
8	Mechanical Engg.	Product Design and Manufacturing	28/01/2019	21/04/2019	04/02/2019	Mr. Vijay Karna/ Mr. Ajeet Bergaley/ Dr. Amit Kumar Gupta	https://swayam.gov.in/courses/5538-jan-2019-product-design-and-manufacturing
9	Computer Engg.	Machine Learning For Engineering And Science Applications	28-01-2019	21-04-2019	04-02-2019	Dr. G L Prajapati and Dr. Vaibhav Jain	https://swayam.gov.in/courses/5402-jan-2019-machine-learning-for-engineering-and-science-applications
10	Computer Engg.	Introduction To Soft Computing	28-01-2019	21-04-2019	04-02-2019	Er. Amit Kumar Mittal	https://swayam.gov.in/courses/5429-jan-2019-introduction-to-soft-computing
11	IT Engg.	Advanced IOT application	28-01-2019	21-04-2019	04-02-2019	Dr. Vrinda Tokekar/ Dr	https://swayam.gov.in/courses/5446-jan-2019-advanced-iot-applications
12	IT Engg.	Privacy and Security in Online Social media	28-01-2019	21-04-2019	04-02-2019	Dr. Pratosh Bansal	https://swayam.gov.in/courses/5397-jan-2019-privacy-and-security-in-online-social-media

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Dr. Pratosh Bansal

29.12.19

Dr. Pratosh Bansal

Dr. Pratosh Bansal

Dr. Pratosh Bansal

MECHANICAL ENGINEERING DEPARTMENT**Semester-VIII**

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	MER8C1	PRODUCTION & OPERATIONS MANAGEMENT	PC	3-1-0	4
2	MER8C2	VIBRATIONS & NOISE CONTROL	PC	3-1-1	4+1(P)
3	MER8C3	AUTOMOBILE ENGINEERING	PC	3-1-1	4+1(P)
4	MER8EX	--	PE	3-1-1	4+1(P)
5	MER8P2	PROJECT PHASE - II		0-0-7	7(P)
6	MER8V8	COMPREHENSIVE VIVA - VIII	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

List of Elective – I

S.No.	Sub_code	Sub_Name	Type	L-T-P	Credits
1.	MER8E1	CAD / CAM	PE	3-1-1	4+1(P)
2.	MER8E2	Reliability Engineering	PE	3-1-1	4+1(P)
3.	MER8E3	Product Development	PE	3-1-1	4+1(P)
4.	MER8E4	Power Plant Engineering	PE	3-1-1	4+1(P)
5.	MER8E5	Gas Dynamics	PE	3-1-1	4+1(P)

FOR THE STUDENTS WHO OPTED INTERNSHIP IN VIII SEM**Semester-VIII**

S.No	Sub_code	Sub_Name	Type	L-T-P	Credits
1	MER8I1	INTERNSHIP	PC	0-0- 20	20(P)
2	MER8G1	ELECTIVE – I Product Design & Development	PE	3- 0- 0	3
3	MER8G2	ELECTIVE – II Product Design & Manufacturing	PE	3- 0- 0	3
6	MER8VI	COMPREHENSIVE VIVA - VIII	VIRTUAL	0- 0- 4	4(P)
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name		Instructions Hours per Week		Credits				
MER8C1 PRODUCTION & OPERATIONS MANAGEMENT		L	T	P	L	T	P	Total
		3	1	0	3	1	-	4
Duration of Theory Paper: 3 Hours								

Learning Objectives:

- The objective of the subject is to provide students with an understanding of the theory underlying operations management
- To enable students to contribute to improved operating decisions.
- This course has gradually incorporated an increasing amount of quantitative methodology because quantitative techniques improved decision making.

Pre requisite(s): Industrial Engineering & Management, Materials Management, Operations Research.

COURSE CONTENTS

UNIT- I

PRODUCTION MANAGEMENT: Definition: Production Management operation function in organizations, Systems view of operations, defining, managing the operations subsystems. Framework for managing operations. Forecasting in operations. Methods of Forecasting, selection of the Forecasting models.

UNIT- II

OPERATIONS CAPACITY AND LAYOUT DECISIONS: Need for facility location planning, factors affecting plant location decisions.

Decision tree analysis, Layout concepts, developing the process layout models & behavior, developing the product layout models (Assembly line models & behavior), manufacturing cellular layouts.

UNIT- III

SCHEDULING SYSTEMS AND AGGREGATE PLANNING: Operations planning and scheduling systems, aggregate planning process, strategies for developing aggregate planning, master production schedule. Loading: various approaches of loading, Sequencing: priorities sequencing rules, detailed scheduling, Expediting.

UNIT- IV

MRP&CAPACITY PLANNING: MRP: Objectives, advantages, limitations, preparation of material requirement plan, closed loop MRP, MRP- II, Capacity planning and environment. Strategies to modify the capacity in the short run & long run. Introduction to ERP.

UNIT- V

MATERIAL, MAINTENANCE & ECONOMIC ANALYSIS: Maintenance: objectives, Importance and types of Maintenance systems Preventive and breakdown maintenance. Economic Analysis: Time Value of Money concept, Capital investment evaluation techniques- Pay back, NPV, IRR etc.

Learning Outcomes:

Upon completing the course student will be able to:

- Understand the fundamentals of Production & Operations Management.
- Apply techniques of demand forecasting in practical situations.
- Take decisions related to plant locations and plant layout.
- Understand the basics of aggregate planning and scheduling systems.
- Know the techniques related to materials requirement, maintenance of production system.

BOOKS RECOMMENDED:

[1] Monks Joseph, *Operation management*, McGraw Hill international, 3e, 1987.

[2] Everett E. Adam, et al, *Production & Operations Management*, Prentice – Hall of India, 5e, 2004.

[3] Chase Richard B., et al, *Operations Management*, Tata MacGraw Hill, 11e, 2006

[4] Buffa E., *Production and Operation Management*, McGraw Hill, T/e

[5] Martand Telsung, *Industrial Engineering & Production Management*, S.Chand & Co. Ltd, 2004.-----

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name		Instructions Hours per Week			Credits		
MER8C2		L	T	P	L	T	P
VIBRATION & NOISE CONTROL		3	1	2	3	1	1
							Total
							5

Learning Objectives:

- The main objective of the subject is to deal with study and analysis of vibration phenomenon, control of vibration in machine parts, balancing.
- The subject also deals with Introduction of basic terminology of noise engineering and noise control.
- The subject also deals with the Whirling of light flexible shaft

Pre requisite(s): Dynamics of machine, Machine Design.

COURSE CONTENTS

UNIT-I

Introduction: Periodical motion, harmonic motion, period, cycle, circular frequency, amplitude and phase angles of vibration motion, non-harmonic periodic motions. classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration Harmonic analysis, the vector method of representing vibrations, displacement, velocity and acceleration in harmonic motion, super position of simple harmonic, beats, work done in harmonic motion .

UNIT-II

System with One Degree of Freedom: System having single degree of freedom, free vibration of systems without damping, equilibrium and energy method for determining natural frequency. Raleigh's method, equivalent systems (systems with compound spring, shafts of different dia. Equivalent length, effect of mass of springs and shaft). Free vibration of systems with viscous, coulomb and structural damping. Equations of motions-discussion of solutions. Forced vibrations of systems with and without viscous and coulomb damping,, frequency response plots, Phase shift plots, Equivalent viscous damping, power consumption of vibration systems, forced isolation, commercial isolators, transmissibility.

UNIT-III

Systems with Two Degree of Freedom: System having two degree of freedom system, Normal mode of vibrations, Torsional systems, undamped & damped vibration in two degree of freedom system with free and forced vibration. Vehicle suspension, Undamped dynamic vibration absorber. Centrifugal absorber, friction damper. Vibration Instruments: Principle of analogies: Electric circuit principles, equivalent circuits.

UNIT-IV

Whirling of Shafts: Whirling of light flexible shaft with an unbalance disk at the Centre of its length with and without damping, discussion of speeds above and below the critical speed, Uniform shaft with and without unbalanced masses attached along its length (by Rayleigh method) for simple supported and fixed ends.

UNIT-V Noise Control: Noise and its causes, sound pressure /intensity/ power level and their interrelation, Decibel scale, Loudness and equal loudness contours, Sound spectra and octave band analysis. Background noise. Weighted networks. Measurement of noise, effect of machine/ process noise on operators, employees and local resident's, standard of noise level and exposure limits. Methods of industrial noise control.

Learning Outcomes:

Upon completing the course student will be able to:

1. Understand the basic phenomenon of Vibration and Noise.
2. Find the natural frequency of different mechanical systems.
3. Find out the performance of viscous dampers in force vibration system.
4. Correlate the Mechanical and Electrical System.

BOOKS RECOMMENDED:

- [1]. Ambekar A.G. "*Mechanical Vibrations and Noise Engineering*" Prentice-Hall of India, New-Delhi, 2e, 2006.
- [2]. [2] Singh V.P., "*Mechanical Vibration*" Dhanpat Rai & Co.(p)Ltd., Delhi, 3e, 2001
- [3]. Thomson W.T "*Theory of Vibration with Application*" CBS Publishers & Distributors, Delhi, 3e, 1990.
- [4]. Grover G.K. "*Mechanical Vibrations*" Nem Chand & Brothers, 2e, 2007.
- [5]. Pujara K. "*Vibration & Noise for Engineers*", Dhanpat Rai & Sons, Delhi, 2e, 1992.

LIST OF PRACTICAL ASSIGNMENTS

- To find the natural frequency of a simple pendulum.
- To determine the radius of gyration of a compound pendulum using vibration phenomenon.
- To determine the radius of gyration of a body using bifilar suspension method.
- To determine the radius of gyration of a body using trifilar suspension method.
- To determine the natural frequency of a spring mass pulley system.
- To determine natural frequency of a spring mass system.
- To determine the natural frequency of an undamped forced vibration system. .

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8C3	L	T	P	L	T	P	Total
AUTOMOBILE ENGINEERING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To understand the principles and working of different systems of automobiles.
2. To understand the principles and design of different systems of automobiles.
3. To understand the principles and working of Microprocessor based automobiles.
4. To understand the principles and working of Electrical systems of automobiles.

Pre requisite(s): IC Engines, Theory of Machines, Dynamics of Machines, Engineering Mechanics.

COURSE CONTENTS

UNIT-I

Chassis and Body Engineering: Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Chassis layout, layout of an automobile with reference to engine location, stability of vehicles, structural dynamics, Performance of Vehicle, types of automobiles.

UNIT-II

Steering System: Front axle beam, Stub axle, Front wheel assembly, Principles of types of wheel alignment, Front wheel geometry viz. camber, Kingpin inclination, Castor, Toe-in and Toe-out, Condition for true rolling motion, Centre point steering, Directional stability of vehicles, Steering Gears, Power steering, Slip angle, Cornering power, Over steer & Under Steer, electronic steering control, Wheels and tyres Specifications, Types, Construction and tread pattern.

UNIT-III

Suspension System: Vehicle Dynamics and requirement of suspension, Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, electronic suspension system, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, Antilock braking system, Performance- Braking efforts, Efficiency, Stopping Distance & time, traction control system,

UNIT-IV

Transmission System: Clutches-requirement, Types and construction, Various Resistances to Motion of Automobile, Traction, tractive effort Performance curves, Need for transmissions, Types and construction, Synchronizer, Gear shifter mechanism, Determination of gear ratio for vehicles, Gear box performance at different vehicle speed, Torque converters, Fluid coupling, Automatic transmission, epicyclic and hydromatic transmission – continuously variable transmission (Continuous Variable Transmission – CVT), Electrical drives: advantages and limitations, Modern electric drive for buses and performance characteristics, Propeller shaft, Universal joints, CV joints, Differential gear box, Rear axle types & construction.

UNIT-V

Electrical and Control Systems: Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Different Bendix drive

systems, Starter relay switch, Electrical accessories -fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Car air conditioning systems, Battery operated vehicles. Microprocessor based control system for automobiles. Intelligent automobiles control systems.

Indian standards for automotive vehicles exhaust emission-Bharat and Euro norms, Indian Motor vehicle act- preliminary information.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the design and working principles of Chassis systems of automobiles.
- Understand the specifications of automobiles.
- Understand the working of all systems of automobiles.
- Learn advanced system of automobiles.
- Industry ready for Automotive industry.

BOOKS RECOMMENDED:

[1] Singh Kirpal, *Automobile Engineering, Vol.1*, Standard Pub, 9e.

[2] Giri N.K., *Automotive Technology*, Khanna Pub, 4e 2009.

[3] Newton & Steeds, *Automobile Engineering*, Butterworth Int.

[4] Heitner Joseph, *Automotive Mechanics, Principles and Practices*, East-West Pub.

[5] Crouse W.H., *Automotive series Part-I to VI*, Tata McGrawhill, 9.e

[6] Crouse W.H., *Automotive Emission*, Tata McGrawhill.

[7] BIS and Euro –I and Euro-II, *Emission standards*.

LIST OF PRACTICAL ASSIGNMENTS:

1. Study of chassis frame and body.
 2. Study by dismantling and assembly of steering linkage mechanism and Steering Boxes.
 3. Study by dismantling and assembly of Front and Rear suspension systems.
 4. Study by dismantling and assembly of hydraulic brake and power brake system.
 5. Study by dismantling and assembly of single plate and multi plate clutch system.
 6. Study by dismantling and assembly of sliding mesh, constant mesh, synchromesh gearboxes.
 7. Study by dismantling and assembly of -Propeller shaft, Differential, Rear axles.
 8. Study of electrical circuit, self-starter and battery.
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Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E1	L	T	P	L	T	P	Total
CAD/CAM	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hrs							

Learning Objectives:

- To understand the basics of CAD/CAM.
- To understand the concepts of computer graphics and its tools.
- To learn about the geometric modeling techniques concerned to the manufacturing of parts.
- To understand the latest advances in the manufacturing methods.

Prerequisite(s): Engineering Drawing, Machine Design & Drawing.

COURSE CONTENTS

UNIT-I

Fundamentals of CAD\CAM: Introduction to CAD\CAM, CIM, CAE, Reverse Engineering, Concurrent/Simultaneous Engineering.

Hardware: Types of Computer Systems, Workstations, Peripheral Devices, Storage Devices, CPU.

Computer Graphics: 2D & 3D Transformations, Concatenations.

CAD/CAM Software Features & its Organizations.

UNIT-II

Computer Aided Design: Introduction to Design process, Product Life Cycle, Areas of Applications and benefits of CAD. Geometrical Modeling: Wire frame and Surface Modeling - Parametric representation of Analytical and Synthetic Curves and Surfaces, Solid Modeling - Boundary representation, Constructive Solid Geometry. Parametric & Variational Modeling. CAD/CAM Data Exchange Standards.

UNIT-III

Computer Aided Manufacturing: Introduction to CAM, Fundamentals of Numerical Control and Computer Numerical Control Systems: Coordinate Systems, Motion and Position Control.

CNC Control Systems: Direct Numerical Control and Distributed Numerical Control, Adaptive Control.

Part Programming Methods: CNC Codes & Standards, Manual Programming, Computer Assisted Part Programming, APT language.

UNIT-IV

Rapid Prototyping Technologies and Robotics: Basic RP Techniques: Stereo Lithography, Selective Photo Curing, Selective Sintering, Fused Deposition Modeling, Laminated Object Manufacturing, 3D Printing, Application of RP Techniques, RP Methodology. Rapid Tooling. Robot Configurations, Motion and Position Control of Robot Arm, Robot Applications.

UNIT-V: Introduction to Group Technology Concept, Part Classification & Coding Systems, Machine Cell Formations, Introduction to Flexible Manufacturing Systems: Concept, Components and Types, CAPP and its types, Computer Aided Inspection and Quality Control.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Understand the importance of CAD/CAM principles in the Product development.
- Develop programs related to manufacturing using codes.
- Analyse the importance of networking in manufacturing environment.

BOOKS RECOMMENDED:

[1]. Groover and Zimmers, *CAD/CAM: Computer Aided Design and Manufacturing*, PHI Pvt. Ltd., New Delhi.

[2]. Groover Mikell P, *Automation, Production Systems and Computer Integrated Manufacturing*, PHI Pvt. Ltd., New Delhi.

[3]. Zeid Ibrahim, *Mastering CAD/CAM*, Tata McGraw Hill Publishing Company Ltd., New Delhi.

[4]. Rao P. N., *CAD/CAM Principles and Applications*, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Edition.

LIST OF PRACTICAL ASSIGNMENTS

- Introduction to CAD/CAM Software (Proe, etc) and understanding its UI and Tools.
- To Perform Wireframe Modeling using Sketching tool.
- To Model a 3D Solids (Gears, Pulleys, Keys, Cotters, Shaft etc.).
- To Perform Surface Modeling.
- To Create 2D drawing from 3D part generated as above.
- To Create Assembly of Parts.
- To Simulate the assembly and create the exploded views.
- To Generate Automated CNC Tool Path and G-Code from Modeled Part.
- To Study the Constructional Features of the CNC Trainer Lathe.
- To create G Code and M Code program for CNC Lathe and Mill Machine.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E2 RELIABILITY ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration -3Hours							

Learning Objectives:

- The objective of the subject is to acquaint the students about the Theory of Reliability.
- The objective of the subject is to acquaint the students about design optimization of mechanical component.
- The objective of the subject is to acquaint the students about the Statistical analysis.

Pre requisite(s): Machine Design, Mathematics I, II, III & IV.

COURSE CONTENTS

UNIT-I

Introduction

Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.

UNIT-II

Theory of Reliability

Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

UNIT-III

Reliability Mathematics

Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis Procedures, empirical reliability calculations.

UNIT-IV

Optimum based Design

Introduction to optimum design, analysis of simple machine members based on optimum design. System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimension.

UNIT-V

Reliability Improvements & Testing

Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series – parallel, stand by and hybrid, effect of maintenance.

Note: Only Data-books, Reliability Tables and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1]. Reliability in Engineering and Design, John Wiley and Sons, 2001.
- [2]. Sinha S.K., Life Testing and Reliability Estimation, Wiley Eastern Ltd, 2003.
- [4] Shooman M.L., Probabilistic Reliability, An Engineering Approach, McGraw Hill, 1998.
- [3]. Sandler G.H., System Reliability Engineering, Prentice Hall, 2001.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the principal of Reliability.
- Understand the design optimization of mechanical component.
- Understand the Weibull analysis, dimensioning.

LIST OF PRACTICAL ASSIGNMENTS

1. Design Analysis of Reliability of M/c component.
2. Problem based on Markov method of Reliability.
3. Optimum Design of M/c component.
4. Problem based on Weibull analysis of Reliability.
5. Problem based on Statistical analysis.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E3	L	T	P	L	T	P	Total
PRODUCT DEVELOPMENT	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- This course provides hands-on and real world experience in the development of innovative and realistic customer-driven engineered products.
- Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to emphasize ingenuity
- Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to provide wide coverage of engineering and business topics.

Pre requisites: Industrial Engineering & Management, Materials Management, Operations Research.

COURSE CONTENTS

UNIT- I

Introduction

Definitions, market needs, product cycle, design methodologies, product specification, conceptual and development phases. Product planning and design decision making. Marketing, forecasting & market research for a new product. Purchasing and sales procedure. Demand analysis for new product.

UNIT- II

Product Design

Introduction to PD, Applications, Relevance, Product Definition, Scope, Terminology. Design definitions, the role and nature of design, old and new design methods, Design by evolution. Need based development, technology based developments. Physical reliability & Economic feasibility of design concepts.

UNIT- III

Development of Prototype Product

Divergent, transformation and convergent phases of product design. Identification of need, Analysis of need. Design for what? Design criteria, functional aspects. Aesthetics, ergonomics, form (structure). Shape, size, color. Mental blocks, Removal of blocks, Ideation Techniques, Creativity.

UNIT- IV

Transformations

Brainstorming & Synectics . Morphological techniques. Utility concept, Utility value, Utility index . Decision making under multiple criteria. Economic aspects of design. Fixed and variable costs. Break-Even Analysis.

UNIT- V

Product Appraisal

Information and literature search, patents, standards and codes. Environment and safety considerations. Existing techniques such as work-study, SQC etc. which could be used to improve method & quality of product. Innovation versus Invention. Technological Forecasting.

Learning Outcomes:

Upon completing the course student will be able to:

10. Understand the fundamentals of product cycle.
11. Apply techniques of demand forecasting in practical situations.
12. Understand the phenomenon of prototype product
13. Know the basics of techniques related product development.
14. Know the various standard procedures related to patenting, environmental and other standards for product appraisal.

BOOKS RECOMMENDED:

- [1] Chitale A.K. & Gupta R.C., Product Design & Manufacturing, PHI (EEE),1e, 2007.
- [2] Crewford R.P., The Technology of Creation Thinking, Prentice Hall, 2e,2004.
- [3] Walls Grohem, The Art of Thought, Bruce & Co., New York.
- [4] Starr M.K., Product Design & Decision Theory, Prentice Hall,2e, 2006.
- [5] Cain C .D., Engineering Product Design , Bussiness Books.
- [6] Ulrich, K.T. and Eppinger, S.D., Product Design and Development, McGraw-Hill/Irwin, 4th ed, 2007 (ISBN 978-0073101422).

ASSIGNMENTS:

- (1) Study and Analysis of product cycle of different product.
- (2) Study and Analysis of forecasting & market research methods for a new product.
- (3) Case studies related to Product Design applications.
- (4) Case studies related to Prototype Development methods for new product.
- (5) Analysis of methods related to transformation of Product idea into product concept & Prototype development.
- (6) Case studies related to standards and codes for product development.
- (7) Case studies related to Environment and safety considerations for product development
- (8) Case studies related to Technological Forecasting for product development.

Devi Ahilya University, Indore, India				IV Year B.E. (Mechanical Engg.)			
Institute of Engineering & Technology				(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E4	L	T	P	L	T	P	Total
POWER PLANT ENGINEERING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The objective of the subject is to acquaint the students about the new and advanced technologies of power generation.
- The objective of the subject is to acquaint the students about the new and advanced technologies of energy scenario.

Pre requisite(s): Steam Engineering, Thermodynamic Power Cycles.

COURSE CONTENTS

UNIT-I

Introduction

Review of world and Indian energy situation in respect of demand, supply and resources in the historic context. Primary and secondary energy sources, their interconvertibility Merits and Demerits and Criterion for selection of power plants.

UNIT-II

Steam Power Plant

Basic principles of siting and station design, Effect of climatic factors on station and equipment design, Choice of steam cycle and main equipment, Recent trends in turbine and boiler sizes and steam conditions, plant design and layout, Outdoor and indoor plant, System components, Fuel handling, Burning systems, Element of feed water treatment plant, Condensing plant and circulating water systems, Cooling towers, Turbine room and auxiliary plant equipment., Instrumentation, Testing and plant heat balance.

UNIT-III

Nuclear Power Plant

Importance of nuclear power development in the world and Indian context, Review of atomic structure and radio activity, Binding energy concept, Fission and fusion reaction, Fissionable and fertile materials, Thermal neutron fission, Important nuclear fuels, Moderators and coolants, their relative merits, Thermal and fast breeder reactors, Principles of reactor control, Safety and reliability features.

UNIT-IV

Hydro-Power Plant: Elements of Hydrological computations, Rainfall run off, Flow and power duration curves, Mass curves, Storage capacity, Salient features of various types of hydro stations, Component such as dams, Spillways, Intake systems, Head works, Pressure tunnels, Penstocks, Reservoir, Balancing reservoirs, Selection of hydraulic turbines for power stations, Selection of site.

UNIT-V

Diesel Engine and gas turbine power plants: Applications of diesel engines in power field, Types of diesel plants, Layout of a diesel engine power plant, Components of gas turbine plant, Gas turbine fuels, Gas turbine materials, Performance of gas turbine power plants.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the phenomenon of compressible liquids.
- Understand the phenomenon of flow through nozzles & diffusers.
- Understand the phenomenon of sound waves.
- Understand the phenomenon of shock waves.
- Understand the principles of Flow in constant area ducts with friction.

BOOKS RECOMMENDED:

- [1] Nag, P.K., Power Plant Engineering, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2008.
[2] Arora and Domkundwar, A course in power Plant Engineering, Dhanpat Rai and CO, 2005.
[3] EMI Wakil, Power Plant Technology, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2005.
[4] Sharma PC, Power plant Engineering, Kataria and sons, Delhi.

LIST OF PRACTICAL ASSIGNMENTS

1. Study of Steam Power Plant.
2. Study of Nuclear Power Plant.
3. Study of Hydro-Power Plant.
4. Study of Gas Turbine Power Plants.
5. Study of Diesel Engine Power Plant.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E5 GAS DYNAMICS	L 3	T 1	P 2	L 3	T 1	P 1	Total 5
Duration of Theory Paper: 3 Hours							

Objectives:

- The objective of the subject is to acquaint the students about the fundamental principles of fluid mechanics.
- The objective of the subject is to acquaint the students about the fundamental principles of thermodynamics and compressibility.
- The objective of the subject is to acquaint the students about the fundamental principles of different types of flows.

Pre requisite(s): Fluid Mechanics, Thermodynamics, Heat Transfer.

COURSE CONTENTS

UNIT-I

Introduction

Compressible flow, energy equation, rate equations for control volume, speed of sound –in ideal and perfect gases, in real gases, in almost compressible liquid, in solids, in two phase medium.

UNIT-II

Isentropic Flow with variable area

Comparison of isentropic and adiabatic processes, Mech number variation, stagnation and critical states, Area ratio as function of Mech number, impulse function, Mass flow rate, flow through nozzles, flow through diffusers.

UNIT-III

Flow with Normal Shock Waves

Wave Motion- Wave propagation in an elastic solid medium, sound waves, pressure waves, expansion waves. Development of shock waves, rarefaction waves, governing equations, prandtl-Mayer relation Mach no. downstream of normal shock wave, static pressure ratio across the shock, temperature ratio across the shock, density ratio across the shock, stagnation pressure ratio across the shock, change in entropy across the shock, impossibility of shock in subsonic flow, strength of a shock wave Moving normal shock waves.

UNIT-IV

Flow with oblique shock wave

Nature of flow, fundamental relations, prandtl equation, Rankine-Hugoniot equation, Oblique shock relations, Mach Waves.

UNIT-V

Flow in constant area ducts with friction

Fanno curves, flow equations, solution of fanno flow equations, variation of flow properties and Mach no. with duct length, Isothermal flow. Flow in constant area duct with heat transfer: Reyleigh line, fundamental equations, Reyleigh flow relations, variation of flow properties, Maximum heat transfer.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the phenomenon of compressible liquids.
- Understand the phenomenon of flow through nozzles & diffusers.
- Understand the phenomenon of sound waves.
- Understand the phenomenon of shock waves.
- Understand the principles of Flow in constant area ducts with friction.
- Understand Behavior of Gas under various conditions.
- Use the Gas tables
- Understand basics of compressible flow
- Correlate fundamentals of Gas Dynamics with various mechanical systems

BOOKS RECOMMENDED:

- [1] Bird G. A., *Molecular Gas Dynamics and the Direct Simulation of Gas Flows*, Oxford University.
- [2] Carlo C., *Kinetic Theory and Gas Dynamics*, Springer Verlag.
- [3] Liepmann H., *Elements of Gas Dynamics*, Dover Publication.
- [4] Rathakrishnan E. *Gas Dynamics* Prentice Hall of India.
- [5] Yahya S.M., *fundamentals of compressible flow*, Wiley Eastern Limited New Delhi.

LIST OF PRACTICAL ASSIGNMENTS

1. Analysis of Mass flow rate through nozzles.
2. Study of variation of flow properties and Mach no. with duct length
3. Analysis of Heat Transfer through constant area duct.
4. Study & Analysis of Heat Transfer through fins.
5. Analysis of friction loss through constant area ducts.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8G1 Product Design & Development	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

The Above Course MER8G1 Product Design & Development is as per the course available at

MOOC/SWAYAM Course - I
Applications

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8G2 Product Design & Manufacturing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

The Above Course MER8G2 Product Design & Manufacturing is as per the course available at

MOOC/SWAYAM Course - I
Applications

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

B.E. (Computer Engineering)
New Scheme on Choice Based Credit System w.e.f. 2016-17

Semester-VIII

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	CER8P2	Project Phase -II	--	0-0-7	7
2.	CER8C1	Information Retrieval & Extraction	PC	3-1-0	4
3.	CER8C2	Network & Information Security	PC	3-1-1	4+1(P)
4.	CER8C3	Data Sciences	PC	3-1-1	4+1(P)
5.	CER8E1	--	PE	3-1-1	4+1(P)
6.	CER8V8	Comprehensive Viva - VIII	Virtual	0-0-4	4
TOTAL CREDITS					30
Programme Electives for VII Semester					
1	CER8E1	Soft Computing	PE	3-1-1	4+1(P)
2	CER8E2	Deep Learning	PE	3-1-1	4+1(P)
3	CER8E3	Game AI	PE	3-1-1	4+1(P)
4	CER8E4	Parallel Computing	PE	3-1-1	4+1(P)
5	CER8E5	Human Computer Interaction	PE	3-1-1	4+1(P)

FOR THE STUDENTS WHO OPTED INTERNSHIP IN VIII SEM

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1	CER8I1	Industry Internship	--	0-0-18	18
2	CER8G1	Machine Learning	PC	4-0-0	4
3	CER8G2	Introduction To Soft Computing	PC	4-0-0	4
4	CER8VI	Comprehensive Viva - VIII	Virtual	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER8C1 Information Retrieval & Extraction	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To understand challenges, scale and approaches for Information Retrieval system.
- To study structure and components of Information Retrieval systems.
- To understand design of Information Retrieval system by study of different data structures and algorithms used in design..
- To study means of measuring performance and effectiveness of Information Retrieval system and techniques for improvement.
- To understand Information Extraction and inherent challenges.

Pre requisites: Understanding of Data Structures and Algorithms.

COURSE CONTENTS

UNIT-I

Introduction: Goals and history of IR. The impact of the web on IR., Boolean retrieval: Processing Boolean queries, The extended Boolean model versus ranked retrieval, The term vocabulary & postings lists: Document delineation and character sequence decoding, Determining the vocabulary of terms, Positional postings and phrase queries.

UNIT-II

Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, Spelling correction, Phonetic correction, Index Construction: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Index compression: Statistical properties of terms in information retrieval, Dictionary compression, Postings file compression.

UNIT-III

Scoring, term weighting & the vector space model: Parametric and zone indexes, Term frequency and weighting, The vector space model for scoring, Variant tf-idf functions. Computing scores in a complete search system: Efficient scoring and ranking, Components of an information retrieval system, Vector space scoring and query operator interaction.

UNIT-IV

Evaluation in information retrieval: Information retrieval system evaluation, Standard test collections, Evaluation of unranked retrieval sets, Evaluation of ranked retrieval results, Assessing relevance, Results snippets, Relevance feedback and query expansion, XML retrieval.

UNIT-V

Information Extraction and Other Issues: Language models for information retrieval, Flat clustering, Hierarchical clustering, Web search basics, Web crawling, Information extraction: Task and evaluation.

Learning Outcomes:

Upon completing the course, students will be able to:

- have clear understanding of design of Information Retrieval system.
- Design and code components of Information Retrieval system.
- Understand evaluation of performance and effectiveness of Information Retrieval System.
- Have understanding of working of Web Search system.
- Understand Information Extraction task.

BOOKS RECOMMENDED:

[1] Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, *Introduction to Information Retrieval*, Cambridge University Press Cambridge, 2014.

[2] Bruce Croft, Donald Metzler and Trevor Strohman, *Search Engines: Information Retrieval in Practice*. Addison Wesley, 2009.

Subject Code & Name	Instructions Hours per Week			IV Year B.E. (Computer Engineering (Full Time) Credits				
	L	T	P	L	T	P	Total	
CER8C2								
NETWORK & INFORMATION SECURITY Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Learning Objectives:

1. To impart the knowledge and in-depth reference to current information and network security standards and procedures.
2. This course provides you with an overview of data and computer security and concentrates in technical and continuity management issues.
3. Allow the student to gain expertise in some specific areas of information security such as the design and providing security to individual networks.

Prerequisites :

Basic knowledge of programming and Computer Networks

COURSE CONTENTS Unit I

Introduction: The need for security, security approaches, principles of security services, mechanisms and attacks, a model for network security. substitution & transposition techniques, steganography, key range & key size.

Unit II

Symmetric Cipher: An general idea of symmetric key cryptography, classical symmetric ciphers, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

Unit III

Asymmetric Cipher: RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

Unit IV

Information Security Protocols: Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3- D Secure Protocol, Email Security, and Kerberos.

Unit V

Network Security: Deffie-Hellman key exchange, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing. Introduction to blockchain technology and cryptocurrency.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Acquire a practical overview of the issues involved in the field of information security.
- Demonstrate a basic understanding of the practice of IS, especially in the evaluation of information security risks across diverse settings including the Internet and WWW-based commerce systems, high bandwidth digital communications and funds transfer services.
- The learning outcome is students shall be able to understand what are the common threats faced today, what are the foundational theory behind information security, what are the basic principles and techniques when designing a secure system, how to think adversarial, how today's attacks and defenses work in practice, how to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.
- Familiarity with the basic protocols of Information Security, and how they can be used to assist in network security design and implementation.

Books Recommended:

- [1] Douglas R. Stinson; Cryptography Theory and Practice; 2nd Edition, Chapman & Hall/CRC
- [2] Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education
- [3] Bernard Menezes; Network Security and Cryptography; Cengage Learning India Pvt
- [4] Ltd.
- [5] Neal Krawetz; Introduction to Network Security; 2nd Edition, Thomson Learning Inc.

List of Practical Assignments:

During learning, of course, students need to do assignments:

1. Implementation of various symmetric key algorithms.
2. Implementation of various asymmetric key algorithms.
3. Implementation of Algorithm types and modes (Electronic Code Book (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB)).
4. Study of Pretty Good Privacy open source security tool for email security.
5. Implementation of digital certificates.
6. Study of IP Tables.
7. Implementation of various open source security tools (Wireshark, Nmap, tables, pretty good privacy, Snort, LC5, OpenVPN, TrueCrypt, THC Hydra).

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IVYear B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER8C3 Data Sciences	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- This course will introduce students to data science basic principles and tools as well as its general mindset.
- Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication.

Prerequisites: Basic knowledge of algorithms and sufficient programming experience and familiarity with basic linear algebra, probability and statistics.

COURSE OF CONTENTS

Unit 1 :Introduction to Data Management

What is Data Science?, Data Science Languages, Data Warehousing & OLAP, Data Preparation, Data Wrangling etc.

Unit 2 :Statistics and EDA

Descriptive Statistics, Inferential Statistics, Exploratory Data Analysis, Hypothesis Testing etc.

Unit 3 :Machine Learning

Linear Regression, Supervised Classification – K-Nearest Neighbors, Clustering – K-Means etc., Decision Trees, Support Vector Machine and Neural Networks etc.

Unit 4 :Big Data Analytics

Introduction to Big Data and Hadoop, Managing Big Data, Introduction to SPARK, Big Data Analysis etc.

Unit 5 :Advance Topics

Mining Social Network graphs; Privacy, Security and Ethical Issues in Data Science; Data Visualization; Recommended Systems etc.

RECOMMENDED BOOKS

- [1] Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
- [2] Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011.
- [3] Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. ISBN 0387952845. 2009.
- [4] Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013.
- [5] Allen Downey. Think Python. Oreilly. First Edition. ISBN 144933072X. 2012.
- [6] Joel Grus. Data Science from Scratch. Shroff. ISBN 9352130960. 2015.

Learning Outcomes:

At the conclusion of the course, students should be able to:

- Describe what Data Science is and the skill sets needed to be a data scientist.
- Use Python to carry out basic statistical modeling and analysis.

- Apply EDA and the Data Science process in a case study.
- Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), K-Means) for predictive modeling.
- Create effective visualization of given data, reason around ethical and privacy issues in data science conduct and apply ethical practices. e

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Computer Engineering			
Subject Code & Name	ons Hours per Week			Credits			
CER8E1	L	T	P	L	T	P	Total
Soft Computing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize with neural networks and learning methods for neural networks.
- To introduce basics of genetic algorithms and their applications in optimization and planning.
- To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
- To develop skills thorough understanding of the theoretical and practical aspects of Soft Computing.

COURSE CONTENTS

UNIT-I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing ,Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

UNIT-II

NEURAL NETWORKS

Backpropagation Networks, Architecture: perceptron model, single layer artificial neural network, multilayer perceptron model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

UNIT-III

GENETIC ALGORITHMS

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems. Simulated annealing and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

UNIT-IV FUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfications&Defuzzificataions, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-V

NEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification , Neuro Fuzzy Control , Case studies.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Identify and describe soft computing techniques and their roles in building intelligent machines.
- Apply neural networks to pattern classification and regression problems
- Recognize the feasibility of applying a soft computing methodology for a particular problem
- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- Apply genetic algorithms to combinatorial optimization problems.

BOOKS RECOMMENDED:

- [1] S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.
- [2] Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.
- [3] Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence- Bart Kosko, Prentice Hall, 1992.
- [4] Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
- [5] David E. Goldberg, “Genetic Algorithms in search, Optimization & Machine Learning” ,Addison-Wesley, 1997.

Devi Ahilya University, Indore, India				IV Year B.E. (Computer Engineering)			
Institute of Engineering & Technology							
Subject Code & Name	ons Hours per Week			Credits			
CER8G1	L	T	P	L	T	P	Total
Machine Learning	4	0	0	4	0	0	4
Duration of Theory Paper:3 Hours							

**The Syllabus for the CER8G1 is as per the MOOC/SWAYAM Course-1 .
They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.**

Devi Ahilya University, Indore, India				IV Year B.E. (Computer Engineering)			
Institute of Engineering & Technology							
Subject Code & Name	ons Hours per Week			Credits			
CER8G2	L	T	P	L	T	P	Total
Introduction to Soft computing	4	0	0	4	0	0	4
Duration of Theory Paper: 3 Hours							

The Syllabus for the CER8G2 is as per the MOOC/SWAYAM Course-II .

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

B. E. IV YEAR ELECTRONICS & INSTRUMENTATION ENGINEERING (CBCS)
L -Lecture, T – Tutorial, P – Practical, PC-Programme core, PE-Programme Elective,
CBCS- Choice based credit system
Semester-VII

Semester-VIII (For Students not opting for Internship)

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	EIR8P2	PROJECT PHASE-II	PC	0-0-7	7
2	EIR8C1	EMBEDDED SYSTEM	PC	3-1-0	4
3	EIR8C2	OPTICAL INSTRUMENTATION	PC	3-1-1	4+1(P)
4	EIR8C3	INTERNET OF THINGS	PC	3-1-1	4+1(P)
5	EIR8EX	--	PE	3-1-1	4+1(P)
6	EIR8V8	COMPREHENSIVE VIVA	VIRTUAL	0-0-4	4
PROGRAMME ELECTIVE (ANY ONE FROM LIST GIVEN BELOW)					
5	EIR8E1	NETWORK SECURITY	PE	3-1-1	4+1(P)
5	EIR8E2	MACHINE LEARNING	PE	3-1-1	4+1(P)
5	EIR8E3	IP NETWORKS	PE	3-1-1	4+1(P)
5	EIR8E4	MOBILE COMPUTING	PE	3-1-1	4+1(P)
TOTAL CREDITS					30

Semester-VIII (For Students opting for Internship)

S.No	Subject code	Subject Name	Type	L-T-P	Credits
	EIR8I1	INTERNSHIP	PC	0-0-20	20
*Two Elective courses to be chosen from SVAYAM-NPTEL (Shortlisted by Departmental Committee)					
3	EIR8G1	Introduction To Photonics	PE	3-0-0	3
4	EIR8G2	Cryptography & Network Security	PE	3-0-0	3
5	EIR8VI	COMPREHENSIVE VIVA	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

*Courses from SVAYAM- NPTEL
(JAN- APRIL 2019)

1. INTRODUCTION TO PHOTONICS (Enrollment end date: 4/2/19; Start date: 28/1/19 End date: 24/4/19)
CRYPTOGRAPHY AND NETWORK SECURITY (Enrollment end date: 27/2/19; Start date: 28/1/19 End date: 21/4/19)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR8P2 PROJECT PHASE-II	0	0	14	0	0	7	7

Learning Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

Prerequisites: Electronics and Computer related subjects till III year.

COURSE CONTENTS

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics/Communication, VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Work in a team
- Develop small working projects through designing, analysis and testing of model
- Able to give presentation on the project developed

BOOKS RECOMMENDED:

[1] Reference books and web links of the relevant material the must be consulted as advised by the guide.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C1	L	T	P	L	T	P	Total
EMBEDDED SYSTEM	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objective:

- The goal of the course is to teach the concepts C Language and object oriented programming, PIC architecture and peripheral interfacing.
- To read and understand the C and C++ programming, PIC microcontroller architecture and programming and RTOS.
- The course focuses on how to write program and peripheral interfacing of PIC microcontroller and develop the applications.

Prerequisite: Knowledge of C language, Computer architecture and Microcontroller.

COURSE CONTENTS

UNIT I -Introduction to Embedded systems: Embedded systems, processor embedded into a system, embedded hardware units and devices in a system, embedded software in a system, examples of embedded systems, embedded SOC and use of VLSI circuit design technology, Complex systems design and processors, Design process in embedded system, formalization of system design, design process and design examples, classification of embedded systems, skills required for an embedded system designer.

UNIT II- Microcontrollers: PIC 16 Series family overview, an architecture overview of the 16F84A, Status register, 16F84A memory, Some issues of timing, Power-up and Reset, PIC 16F84A parallel ports, 16F84A clock oscillator, 16F84A operating conditions, 16F84A interrupt structure.

UNIT III-Larger systems and the PIC 16F873A:The main idea –the PIC 16F87XA, The 16F873A block diagram and CPU, 16F873A memory and memory maps, 16F873A interrupts, 16F873A oscillator, reset and power supply, 16F873A parallel ports.

UNIT IV-RTOS: Basic design using RTOS, Micro/OS-II and Vxworks, windows CE, OSEK, real-time Linux functions,

UNIT V- Case study: Digital camera hardware and software architecture, embedded systems in automobile, embedded system for a smart card, mobile phone software for key inputs.

Learning Outcome:

After learning the course the students should be able to

- Understand the fundamentals of embedded systems
- Understanding of C and basics of C Understand the OOP concepts of classes, objects, methods,

- constructors, destructors in C++
- Understand the microcontroller architecture (PIC)
- Understand and able to write the assemble language program.
- Understand and able to write the I/O and timers/counter programming

BOOKS RECOMMENDED:

- [1]. Embedded Systems Architecture Programming and Design by Raj Kamal, II edition, Tata MCGraw-Hill.
- [2]. Designing Embedded Systems with PIC Microcontroller s: principles and applications by Tim Wilmshurst, Elsevier.
- [3]. Embedded Systems Design by Steve Heath, II edition, Newnes publications
- [4]. Embedded Systems Architecture: A Comprehensive Guide for Engineers and
- [5]. Programmers by Tammy Noergaard, Elsevier

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C2 OPTICAL INSTRUMENTATION	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: To understand fundamentals of optical communication system, its various elements, and optical networking

Prerequisites: Basic knowledge of electromagnetic theory

COURSE CONTENTS

UNIT-I

Introduction to optical fiber communication system, Advantages of optical fiber communication over conventional electrical communication, review of optical fiber fundamentals, ray theory transmission, electromagnetic mode theory for optical propagation in optical waveguides, Types of optical fibers: step index fibers, graded index fibers, single mode fibers etc., cut off wavelength

UNIT-II

Transmission characteristics: fiber attenuation, absorption and scattering losses, fiber bend loss, fiber dispersion, intermodal and intra-modal dispersion, overall fiber dispersion, dispersion shifted fibers, dispersion flattened fibers, non-zero-dispersion shifted fibers, polarization maintaining fibers.

UNIT-III

Optical sources: Lasers and LEDs: basic concepts, injection laser, characteristics, temperature dependence, dynamic response, noise, reliability, Optical detection principle, absorption, quantum efficiency, responsivity, large wavelength cut off, pin photodiode, avalanche photodiode, receiver: basic concepts and types of noise.

UNIT-IV

Optical networks: Basic principles and components, couplers, isolators, circulators, multiplexers: gratings, Fabry perot filters, multilayer dielectrics, Mach-Zehnder interferometer, Acousto-optic tunable filters, Optical amplifiers-Semiconductor optical amplifiers, Erbium doped fiber amplifiers, wavelength converters, optical switches, optical add-drop multiplexers

UNIT-V

Optical networks: architecture, Synchronous optical network/ synchronous digital hierarchy-elements, multiplexing, layers, frame structure, WDM network architectures, broadcast and select networks, wavelength routed networks, routing and wavelength assignment (RWA), access networks, Optical OFDM, Flexible optical networks

Learning Outcomes:

Upon completing the course, students will be well versed with the fundamental concepts of optical instrumentation, and will be able to contribute to the current and upcoming advances in the technology.

BOOKS RECOMMENDED:

- [1] John M Senior, Optical fiber Communication: Principles and Practice, Pearson Education -2006
- [2] Gerd Keiser, Optical fiber communication, Fifth Edition McGraw Hill Education (India), 2013
- [3] Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks : A Practical Perspective", Harcourt Asia Pte Ltd., Second Edition 2004.
- [4] C. Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks : Concept, Design and Algorithms", Prentice Hall of India, 1st Edition, 2002

List of Practical Assignments:

- To set-up a fiber optic analog link
- To set up a fiber optical digital link
- To obtain intensity modulation of an analog signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- To obtain intensity modulation of a digital signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- To study the frequency modulation in case of fiber optic communication system.
- To undertake the pulse width modulation in case of fiber optic communication system.
- To determine the propagation losses in case of optical fiber communication system.
- To evaluate bending losses in case of optical fiber communication system.
- To determine the numerical aperture of an optical fiber
- To study the characteristics of frequency modulation in case of fiber optic communication system.
- To plot the electrical to optical conversion characteristics

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C3	L	T	P	L	T	P	Total
INTERNET OF THINGS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Prerequisite: Computer Network, C Language

COURSE CONTENTS

Unit I

IoT Introduction, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit II

Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Unit III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IoT Security, Common Challenges in IoT Security, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment

Unit V

IoT Physical Devices and Endpoints - Building iot with Arduino: Arduino – Interfaces - Arduino IDE – Programming , RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Learning Outcomes:

At the end of the course, the students would be:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

BOOKS RECOMMENDED:

- [1].David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT
- [2].Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”,
- [3].1 st Edition, Pearson Education
- [4].Srinivasa K G, “Internet of Things”, CENGAGE Learning India, 2017.
- [5]. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1 st Edition,
- [6].VPT, 2014.
- [7]. Raj Kamal, “Internet of Things: Architecture and Design Principles”, 1st Edition, McGraw
- [8].Hill Education, 2017.

List of Practical Assignments:

1. To study the architecture of application board of Raspberry Pi.
2. To demonstration the OS (Debian) for RPi in a SD card preparation, configuration of Raspberry Pi during first booting and use of remote SSH like putty
3. To demonstrate the basic linux commands on Raspberry pi.
4. To create a database & Store the value in Raspberry Pi.
5. To install Android on Raspberry Pi.
6. To Setup R Pi first time without using screen, mouse, keyboard.
7. To interface ADC at GPIOs of Raspberry Pi for measuring analog voltage.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8E1	L	T	P	L	T	P	Total
NETWORK SECURITY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the fundamentals of Cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

Prerequisite: Computer Network

COURSE CONTENTS

Unit I

An overview of network system & OSI model, concept of security- approaches and principles , attacks, cryptography technique, encryption & decryption, substitution & transport technique, symmetric & asymmetric cryptography,

Unit II

An overview of symmetric key cryptography algorithm types and modes, data encryption standard (DES), Advanced encryption standard(AES)-criteria, transformation , International data encryption algorithm (IDEA).

Unit III

Asymmetric key cryptography, RSA cryptosystem-, Digital signature -process ,service & scheme, Knapsack algorithm, ElGamal algorithm, public key exchange, attacks on RSA, attacks on digital signature.

Unit IV

Digital certificates ,private key management, public key cryptography standards, XML ,PKI & security,, internet security protocols, SSL,TSL,SHTTP, secure electronic Transaction, email, security, security in 3G, GSM,IEEE802.11,

Unit V

User authentication mechanism, Biometric authentication, Kerberos, Password, Authentication tokens, IP security overview & policy, Firewall characteristic, VPN, Malicious software, Intruder, Email security.

Books Recommended:

- [1]. Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education. Pearson Education, 2006.
- [2]. Atul kahate ; Cryptography & Network Security, Third edition ,McGraw hill education
- [3]. Behrouz A. Forouzan, Cryptography & Network Security, Tata McGraw hill, 2007.
- [4]. Matt Bishop ,“Computer Security art and science ”, Second Edition, Pearson Education, 2002.

Learning Outcomes:

At the end of this course, students will be able to:

- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures.
- Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations.
- Formulate research problems in the computer security field.

List of Practical Assignments:

- 1) Design and implementation of a simple client/server model and running application using sockets and TCP/IP.
- 2) To make students aware of the insecurity of default passwords, printed passwords and password transmitted in plain text.
- 3) To teach student how to use SSH for secure file transfer or for accessing local computer using port forwarding technique.
- 4) Comparison between Telnet and SSH for Secure Connection

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8E2 MACHINE LEARNING	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better

Prerequisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE CONTENTS

Unit-I Introduction:

Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II Supervised Learning:

Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III Unsupervised Learning:

Introduction to unsupervised learning -Clustering -Classification of clustering algorithms, Computational Learning theory, PAC Learning, VC dimension. Artificial Neural Networks Learning: Neural Network Representation, Perceptron, Backpropagation algorithm.

Unit-IV Language Learning:

Classification problems in language: word-sense disambiguation, Formal Language learning, introduction to Hidden Markov models (HMM's).

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators..

Unit-V Genetic Algorithms (GAs):

Motivation, Representing Hypotheses, Genetic operators, fitness Function and Selection, Working of Genetic Algorithm, Evolutionary Programming and Genetic Programming, Case studies of Machine Learning data sets .

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

BOOKS RECOMMENDED:

- [1].Tom Mitchell, Machine Learning, McGraw-Hill, 1997.
- [2] Richard O. Duda, Peter E. Hart & David G. Stork, Pattern Classification, Wiley & Sons, 2001.
- [3] Ethem Alpaydin, Introduction to Machine Learning, MIT Press, 2004.
- [4] David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] Zbigniew Michalewicz, Genetic Algorithms + Data Structures = Evolution Programs, Springer, 1999.

List of Practical Assignments:

List of Assignment in Machine Learning Lab:

- 1) Problem based on different machine Learning algorithm
- 2) Works on different machine learning Tools
- 3) Case Study on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8G1 Introduction To Photonics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	0	0	3	0	0	3

The Above Course EIR8G1 Introduction to photonics is as per the course available at

**MOOC/SWAYAM Course - I
Applications**

**They will be offered in self study/ MOOCS mode for students who have opted for
internship and went at other institutions/organization.**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8G2 Cryptography & Network Security	L	T	P	L	T	P	Total
	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

The Above Course EIR8G1 Introduction to photonics is as per the course available at

**MOOC/SWAYAM Course - I
Applications**

**They will be offered in self study/ MOOCS mode for students who have opted for
internship and went at other institutions/organization.**

IV BE (Information Technology)**CBCS SCHEME****Semester-VIII-A (Scheme for students who opted for Project work)**

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	ITR8P2	Project Phase - II	--	0-0-7	7
2.	ITR8C1	Data warehousing and Mining	PC	3-1-1	4+1(P)
3.	ITR8C2	Human-Computer Interaction	PC	3-1-1	4+1(P)
4.	ITR8EX	--	PE	3-1-1	4+1(P)
5.	ITR8G6	Principles of Mobile Computing	GE	3-1-0	4
6.	ITR8V8	Comprehensive Viva - VIII	Virtual	0-0-4	4
				TOTAL CREDITS	30
Programme Electives for VIII Semester					
4.	ITR8E1	Machine Learning	PE	3-1-1	4+1(P)
4.	ITR8E2	Enterprise Resource Planning	PE	3-1-1	4+1(P)
4.	ITR8E4	Blockchain Architecture and Design	PE	3-1-1	4+1(P)
4.	ITR8E6	Digital Forensics	PE	3-1-1	4+1(P)

Semester-VIII-B (Scheme for students who opted for internship)

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
7.	ITR8I1	Industry Internship	--	0-0-18	18
8.	ITR8G1	Advanced IOT application	PC	4--0-0	4
9.	ITR8G2	Privacy and Security in Online Social	PC	4-0-0	4
10.	ITR8VI	Comprehensive Viva - VIII	Virtual	0-0-4	4
				TOTAL CREDITS	30

*They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8C1	L	T	P	L	T	P	Total
Data warehousing and Mining	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To learn the latest development of Data warehousing & data mining concepts and techniques.
- To understand and apply theories and wide range of data mining algorithms.
- To develop skills for using recent data mining software, including WEKA, SPSS, or the R language to solve practical problems in a variety of disciplines.
- To develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

UNIT I

Data Warehouse:

Introduction to Data Warehouse, Differences between OLAP and OLTP. Data Warehouse characteristics, Data Warehouse Architecture and its components, Extraction-Transformation-Loading, Data Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT II

Introduction to Data Mining:

Introduction to Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing- Data Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of similarity and dissimilarity-Basics.

UNIT III

Classification:

Problem definition, General Approaches to solving a classification problem, Issues regarding classification, Classification techniques, Decision trees-Decision Tree Construction, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes classification, Bayesian Rule-based classification, Classification by back-propagation.

UNIT IV

Association Rules:

Introduction to Association Rule, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT V

Clustering:

Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm-Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and weakness, Outlier Detection.

RECOMMENDED BOOKS

- [1] Sam Anahory and Dennis Murray, Data Warehousing in the real World, Pearson Education Asia, 2000.
- [2] P. Tan, M. Steinback and V. Kumar, Introduction to Data Mining, Addison Wesley, Second Edition, 2016.
- [3] J. W. Han and M. Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, San Francisco, CA, Third Edition, 2011.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of Data Warehousing and various Data Mining Algorithm useful for solving the real world problems.

List of Assignment in Data Mining Lab:

- Problem based on different Data Mining algorithm
- Works on different Data Mining Algorithm
- Case Study on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8C2 Human Computer Interaction	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the principles, techniques and methods in the field.
- To introduce students to theoretical frameworks, models and major developments in HCI.
- To design and evaluate interactive technologies on various grounds to improve the interaction between humans and computers.

Pre-requisites: Fundamentals of programming using structured and object-oriented languages along with a basic understanding of creation of user interfaces using some GUI development tool.

COURSE CONTENTS

UNIT I

Introduction, History and Foundations of HCI, the challenges: People and Technology, human and Machine- Interaction, Command Line Interface, Graphical Us Interface, Ergonomics, Cybernetics, Haptics, Usability of a computer based interactive system, areas of knowledge that relate with HCI, HCI in the context of mobile devices, consumer devices, business applications, scientific applications, web-based applications, collaboration systems, games, etc. Social issues influencing HCI

UNIT II

Basics of Interaction Design: Design, Design process, Navigation design, Screen design and layout. Design rationale. Rules for designing GUIs: Principles, Standards, Guidelines, Golden rules and heuristics, HCI patterns. Implementation details: Perception, gestalt perception, typography, Graphic design- color, display, paper, and other output devices, designing forms and information visualization, events, action object and object action. Overview of the elements of windowing systems, Programming the application, using toolkit and User interface management systems. Software process involved in HCI, Usability engineering, Iteration and prototyping, virtual reality.

UNIT III

Evaluation, Universal Design and User Support: Evaluation techniques: evaluation, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, choosing an evaluation method. Heuristic evaluation and cognitive walkthroughs. Universal design: principles, Multi-modal interaction, designing for diversity. User support: Requirements of user support, Approaches to user support, Adaptive help systems, designing user support systems.

UNIT IV

Models and Theories: Cognitive models: Goal and task hierarchies, Linguistic models, The challenge of display-based systems, Physical and device models, Cognitive architectures. Socio-organizational issues and stakeholder requirements: Organizational issues, Capturing requirements. Communication and collaboration models: Face-to-face communication, Conversation, Text-based communication, Group working. Task analysis: Differences between task analysis and other techniques, Task decomposition, Knowledge-based analysis, Entity–relationship-based techniques, Sources of information and data collection, Uses of task analysis. Dialog notations and design, Models of the system: Standard formalisms, Interaction models, Continuous behavior. Modeling rich interaction.

UNIT V

Groupware, Ubiquitous computing and WWW: Groupware: Groupware systems, Computer-mediated communication, Meeting and decision support systems, Shared applications and artifacts, Frameworks for groupware, implementing synchronous groupware. Ubiquitous computing and augmented realities: Ubiquitous computing applications research, Virtual and augmented reality, Information and data visualization. Hypertext, multimedia and the World Wide Web: Understanding hypertext, Finding things, Web technology and issues, Static web content, Dynamic web content. Case Studies.

Learning Outcomes:

1. Evaluate the usability of a computer- based system using the concepts studied with respect to HCI
2. Integration of HCI concerns in the software development process

BOOKS RECOMMENDED:

- [1] Alan Dix, Janet E. Finlay, “Human-Computer interaction”, Pearson Education.
- [2] Olsen, “Human-Computer Interaction”, Cengage Learning.
- [3] Preece, J. Sharp, H. & Rogers, “Interaction design: beyond human-computer interaction”, Y. Wiley.
- [4] Smith Atakan Serengal, “Human-Computer Interaction”, Cengage Learning.

List of Practical Assignment (Tentative):

- Designing command line interface (CLI)-based programs using argc and argv in C/ C++.
- Designing command line interface (CLI)-based programs using String args[] in Java.
- Hands on experience with the Java AWT to create simple GUIs
- Designing a simple GUI and a few complex GUIs using Visual Basic or other tools of student’s choice.
- Evaluation of a few websites and documenting observations.
- Evaluation of a few forms with respect to usability, verification and validation.
- Building an interface using prototyping paradigm
- Documentation of the tool the student has used for building GUIs.
- Study and working with the haptic glove available with the university.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8E1	L	T	P	L	T	P	Total
Machine Learning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce the theoretical foundations of machine learning & Deep Learning.
- To provide practical experience of applying machine learning & Deep Learning techniques
- To investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of probability and statistics and computer programming.

COURSE OF CONTENTS

Unit-I

Introduction:

Definition, Applications of machine learning, Machine Learning Workflow, Define Problem, Specify Inputs & Outputs, Exploratory Data Analysis, Data Collection, Data Preprocessing, Data Cleaning, Visualization, Model Design, Training, and Offline Evaluation, Model Deployment, Online Evaluation, and Monitoring, Model Maintenance, Diagnosis, and Retraining.

Unit-II

Machine Learning Algorithms:

Aspects of developing a learning system: Training Data, Validation Data and Test data, Types of learning: supervised, unsupervised and Reinforcement learning, Classification and Regression learning methods, Linear Regression with One Variable, Linear Regression with Multiple Variables, Logistic Regression, Support Vector Machine.

Unit-III

Introduction to Neural Networks:

Neural Network Representation, Perceptron, Artificial Neural Network, Backpropagation algorithm. Backpropagation Intuition, Random Initialization, Diagnosing Bias vs. Variance, Regularization and Bias/Variance. Learning Rate, implementing gradient descents, training neural networks, Cost Function.

Unit-IV

Deep Learning:

Introduction, Application, Deep neural network, Single Layer Perceptron Model (SLP), Multilayer Perceptron Model (MLP), Fully Connected (FC) Layer, Convolutional neural networks, recurrent neural networks, Activation Function, Sigmoid, Rectified Linear Units (ReLU), tanh, SoftMax, Pooling Layer, Bias, Variance, Hyperparameters, Data Augmentation,

Unit-V

Convolutional Neural Networks:

Terminologies: Channels, pooling, Padding, Stride, Preparing the image, Generate filters, Convolve using filters Measuring performance, CNN models: LeNet, AlexNet, ResNet, MobileNet, YoLo Algorithm, Recurrent Neural Networks, Generative Adversarial Networks.

RECOMMENDED BOOKS

- [1] Michael Bowles, Machine Learning in Python, John Wiley & Sons, Inc., 2015
- [2] Jason Brownlee, Machine Learning Mastery With Python, 2016.
- [3] Machine Learning with TensorFlow, Version 10, 2017, Manning Publications.
- [4] Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, 2016

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning & Deep Learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

- Problem based on different machine Learning & Deep Learning
- Works on different machine learning & Deep Learning Tools
- Case Studies on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8E4: Blockchain Architecture and Design	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To learn the conceptual and application aspects of Blockchain.
- To know the design and architectural primitives of Blockchain
- To know system and security aspects along with various use cases

Prerequisites: Basic concepts of data security

UNIT-I

Introduction to Blockchain – Basics, History, Blockchain as Public Ledger, Block in a Blockchain Transaction, Distributed Consensus, Chain and the Longest Chain, review of Basic Crypto Primitives, Cryptographic Hash Function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, cryptocurrency, Blockchain Components and Concepts, Actors in a Blockchain, Components in Blockchain design, Ledger in Blockchain

UNIT-II

Bitcoin Basics – Creation of coins, Payments and double spending, the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay

UNIT-III

Distributed Consensus- Why Consensus, distributed consensus in open environments, Consensus in a Bitcoin network, Bitcoin Consensus, Proof of Work (PoW) – basic introduction, Hashcash PoW, Bitcoin PoW, Proof of stake, Consensus in Bitcoin – The Miners, the life of a Bitcoin Miner, Mining Difficulty, Mining Pool

UNIT-IV

Permissioned Blockchain, Permissioned model and use cases, Design issues for Permissioned blockchains, Execute contracts, State machine replication

UNIT-V

Trust and Vulnerability Short history of the scaling out of human trust. High and Low trust societies, Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary, Blockchain for Enterprise – Overview, Concepts and benefits of blockchain for enterprise, The Hyperledger Project, Hyperledger Fabric – Transaction Flow, Fabric Architecture, Transaction flow in Fabric

Learning Outcomes: Upon completing the course, students will:

- Develop understanding about blockchain and its applicability
- Learn about crypto currency and its creation
- Know about Security aspects of blockchain

Books Recommended:

- [1].Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos
[2].Blockchain by Melanie Swa, O'Reilly
[3].Hyperledger Fabric - <https://www.hyperledger.org/projects/fabric>

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Information Technology Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITRE6: Digital Forensics							
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Course Objective:

- To understand the fundamental concepts of forensic science and digital forensics principles
- Learn to identify importance of digital evidence.

COURSE CONTENT

Unit I :

Digital crime, current scenario of digital crime in India, Evidence and its role in IT Act, Digital Evidence, Digital Vs Physical Evidence, nature of Digital Evidence, precautions while dealing with Digital Evidence, challenging aspects of Digital Evidence, Digital Devices, evidential potential of digital devices, Digital Forensics, dimensions and principles of Digital Forensics,

Unit II :

Seizure of digital information: Issues, methodology, factors limiting wholesale seizure, pulling the plug or not; data objects, Storage Media, Variety of data, Recovered data objects, electronic evidence: secure boot and write blockers, disk file organization, disk and file imaging; forensic tools, forensic data carving, data recovering techniques.

Unit III :

Mobile phone forensics: mobile device characteristics, memory considerations, tools classification, flasher boxes, obstructed devices, forensics procedures: preservation, acquisition, examination and analysis, reporting; SIM Card Forensics. Network Forensics: sources of network based evidences, procedure for applying network based forensics, digital evidence on internet, digital evidence on physical and data link layers, digital evidence at the network and transport layers.

Unit IV :

Risk Analysis: Terms and Definitions, Need, Methodology, Considerations and Approaches. Security Models: IA-CMM, ISM3, SSE-CMM: Importance, Usage, Structure and Architecture, Process Areas; Security Engineering and its need. Security Standards and frameworks: ISO 27001: Evolution, Organizational Context, ISMS Implementation in Organizations; COBIT: Principles, Structure and Objectives.

Unit V :

Security Methodologies: IAM, IEM, OCTAVE, OSSTMM, SIPES.

Laws for Information Security: Introduction to The Indian IT Act, IPR, Patent law, Copyright Law.

Security Audits : Need in Organizations, Auditor's responsibility, Types, Approaches, Technology-Based Audits :

Penetration Testing and Vulnerability Scanning; Phases, Budgeting for Security Audits.

Learning Outcomes: Upon completing the course, students will:

- Develop understanding about Digital forensics and its importance
- Learn about digital data investigation techniques
- Know about Security Audit

Text and Reference books:

[1] Nina Godbole, Information Systems Security-Security Management, Metrics, Frameworks and Best Practices, Wiley, 2009.

[2] Digital Forensics and Cyber Crime; Ibrahim Baggili; Springer.

[3] W. Kruse and J. Heiser, *Computer Forensics: Incident Response Essentials*, Massachusetts, Ed. Boston: Addison Wesley, 2001.

[4] Rick Ayers, Sam Brothers and Wayne Jansen : Guidelines on Mobile Device Forensics, NIST, 14.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (INFORMATION TECHNOLOGY)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8G6 Principles of Mobile Computing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Objectives: To understand the principles and techniques of how computers use and share data in an environment in which location is not fix.

Prerequisites: Basic knowledge of Wireless communication and Networks.

Course Contents

Unit-I

Review of Wireless communication technologies. Mobile computing definition, difference between mobile communication and mobile computing, Adaptability-key to mobile computing, mechanisms for adaptation, Support for building Adaptive Mobile Applications-Transcoding Proxy, Odyssey, Rover models

Unit-II

Mobility Management:

Mobility Management, Location Management principles and techniques: registration area based location management, dynamic update schemes, location caching, replicating location information, flat and hierarchical organization, location management case studies PCS, Mobile IP

Unit-III

Data Dissemination and Management

Challenges, Publish-subscribe mode, information caching, Data Dissemination, mobile data caching, mobile cache Maintenance schemes, Mobile Web Caching

Unit-IV

Context Aware Computing:

Ubiquitous or Pervasive Computing, Context: various definitions and Types, Context Aware Computing and Applications, Middleware support, Middleware for application development: Adaption and Agents.

Unit-V

Service Discovery Middleware: Finding needed Services, Services, Discovery and Advertisement Protocols, Garbage Collection, Eventing, Security, Interoperability.

Learning Outcomes:

Upon Completing the Course, students will gain the knowledge of various issues involved in mobile computing environment and techniques to resolve.

Books Recommended:

[1] Frank Adelstein, Sandeep K. Gupta, Golden G. Richard, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, McGraw-Hill Education (India), 2005.

[2] Reading material from other online sources.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (INFORMATION TECHNOLOGY)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8G1	L	T	P	L	T	P	Total
Advanced IOT Application	4	0	0	4	0	0	4
Duration of Theory Paper: 3 Hours							

The Above Course ITR8G1 Advanced IOT Application is as per the course available at

**MOOC/SWAYAM Course - I
Applications**

**They will be offered in self study/ MOOCS mode for students who have opted for
internship and went at other institutions/organization.**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (INFORMATION TECHNOLOGY)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8G2	L	T	P	L	T	P	Total
Privacy and Security in Online Social Media	4	0	0	4	0	0	4
Duration of Theory Paper: 3 Hours							

The Above Course ITR8G1 Advanced IOT Application is as per the course available at

**MOOC/SWAYAM Course - I
Applications**

**They will be offered in self study/ MOOCS mode for students who have opted for
internship and went at other institutions/organization.**

Semester-VIII (For Students not opting for Internship) E&TC

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	ETR8P2	PROJECT PHASE-II	PC	0-0-7	7
2	ETR8C1	TELECOM NETWORKS	PC	3-1-0	4
3	ETR8C2	OPTICAL COMMUNICATION	PC	3-1-1	4+1(P)
4	ETR8C3	SATELLITE AND NAVIGATION SYSTEM	PC	3-1-1	4+1(P)
5	ETR8EX	--	PE	3-1-1	4+1(P)
6	ETR8V8	COMPREHENSIVE VIVA	VIRTUAL	0-0-4	4
List Of Electives					
5	ETR8E1	INTERNET OF THINGS	PE	3-1-1	4+1(P)
5	ETR8E2	NETWORK SECURITY	PE	3-1-1	4+1(P)
5	ETR8E3	ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY	PE	3-1-1	4+1(P)
5	ETR8E4	DBMS AND DATA ANALYTICS	PE	3-1-1	4+1(P)
5	ETR8E5	MACHINE LEARNING	PE	3-1-1	4+1(P)
TOTAL CREDITS					30

Semester-VIII (For Students opting for Internship)

S.No	Subject code	Subject Name	Type	L-T-P	Credits
1	ETR8CI1	INTERNSHIP	PC	0-0-20	20
Two Elective courses to be chosen from SVAYAM-NPTEL (Shortlisted by Departmental Committee)					
3	ETR8G1	Introduction to photonics	PE	3-0-0	3
4	ETR8G2	Cryptography & Network Security	PE	3-0-0	3
5	ETR8VI	COMPREHENSIVE VIVA	VIRTUAL	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics & Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR8P2 PROJECT PHASE-II	0	0	14	0	0	7	7

Learning Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

Prerequisites: Electronics and Computer related subjects till III year.

COURSE CONTENTS

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics/Communication, VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

Learning Outcomes:

Upon completing the course, Student would be able to:

Work in a team

Develop small working projects through designing, analysis and testing of model Able to give presentation on the project developed

BOOKS RECOMMENDED:

- Reference books and web links of the relevant material the must be consulted as advised by the guide.

Devi Ahilya University, Indore, India			IV Year B.E. (Electronics and Telecommunication)				
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8C1	L	T	P	L	T	P	Total
TELECOM NETWORKS	3	1	0	3	1	0	4
Duration of Theory							
Paper: 3 Hours							

Learning Objectives:

The course contents are aimed to provide:

A detailed working of different telecommunication networks used for accessing broadband.

Prerequisites:

Knowledge of analog communication, digital communication and basics of computer networks.

COURSE CONTENTS

UNIT-I

Introduction : Classification of different wireless and wired telecommunication networks, their comparison, Broadband access, Classification of Legacy broadband technologies, Fixed wired broadband technologies, Fixed wireless broadband technologies, Mobile wireless broadband technologies, Overview of 2G, 3G, 4G & 5G networks, Telecommunication Traffic- unit of traffic, network traffic load and parameters, grade of service and blocking probability.

UNIT-II

Public switched telephone networks (PSTN): Various subsystems of PSTN - subscriber end instruments, subscriber loop systems, transmission system, signalling system, trunk networks. speech digitization, line coding, frame formats used in PSTN, switching.

UNIT-III

Integrated Services Digital Networks (ISDN): Evolution from PSTN, basic principles, architecture and reference points, various frame formats, protocol stack, ISDN services. Broadband ISDN architecture, protocol stack, cell format, BISDN services.

UNIT-IV

Digital subscriber line (DSL): Dial up internet connection, its shortcomings, wired broadband technologies : (DSL), its types ADSL, SDSL, VSDL etc. working principle of DSL, Discrete multi tone modulation, Cable modem & its working principle.

UNIT-V

Optical Access Network: comparison of optical access networks, DSL and cable modem, PON, EPON, GPON and WDM-EPON: overview, principal of operation, architecture, standards; Hybrid Wireless-Optical Broadband Access Network

Learning Outcomes:

- Upon completing the course, student will able to learn about various wired and wireless telecommunication networks used for broadband access, their comparison, technologies used in these networks.

BOOKS RECOMMENDED:

- I S Misra, Wireless Communications and Networks:3G and Beyond, Second Edition, Mc Graw Hill, 2013.
- Thiagrajan Viswanathan, Telecommunications Switching Systems and Networks, PHI, 1998.
- W. Stallings, ISDN and Broad band ISDN with Frame Relay and ATM, Pearson Education, 2005.
- Shami, Abdallah, Maier, Martin, Assi, Chadi (Eds.), “Broadband Access Networks - Technologies and Deployments”, Springer, 2009.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8C2	L	T	P	L	T	P	Total
OPTICAL	3	1	2	3	1	1	5
COMMUNICATION							
Duration of Theory							
Paper: 3 Hours							

Learning Objectives: To understand fundamentals of optical communication system, its various elements, and optical networking

Prerequisites: Basic knowledge of electromagnetic theory

COURSE CONTENTS

UNIT-I

Introduction to optical fiber communication system, Advantages of optical fiber communication over conventional electrical communication, review of optical fiber fundamentals, ray theory transmission, electromagnetic mode theory for optical propagation in optical waveguides, Types of optical fibers: step index fibers, graded index fibers, single mode fibers etc., cut off wavelength

UNIT-II

Transmission characteristics: fiber attenuation, absorption and scattering losses, fiber bend loss, fiber dispersion, intermodal and intra-modal dispersion, overall fiber dispersion, dispersion shifted fibers, dispersion flattened fibers, non-zero-dispersion shifted fibers, polarization maintaining fibers.

UNIT-III

Optical sources: Lasers and LEDs: basic concepts, injection laser, characteristics, temperature dependence, dynamic response, noise, reliability, Optical detection principle, absorption, quantum efficiency, responsivity, large wavelength cut off, pin photodiode, avalanche photodiode, receiver: basic concepts and types of noise.

UNIT-IV

Optical networks: Basic principles and components, couplers, isolators, circulators, multiplexers: gratings, Fabry perot filters, multilayer dielectrics, Mach-Zehnder interferometer, Acousto-optic tunable filters, Optical amplifiers-Semiconductor optical amplifiers, Erbium doped fiber amplifiers, wavelength converters, optical switches, optical add-drop multiplexers

UNIT-V

Optical networks: architecture, Synchronous optical network/ synchronous digital hierarchy- elements, multiplexing, layers, frame structure, WDM network architectures, broadcast and select networks, wavelength routed networks, routing and wavelength assignment (RWA), access networks, Optical OFDM, Flexible optical networks

Learning Outcomes:

Upon completing the course, students will be well versed with the fundamental concepts of optical communication, and will be able to contribute to the current and upcoming advances in the technology.

BOOKS RECOMMENDED:

- [1] John M Senior, Optical fiber Communication: Principles and Practice, Pearson Education - 2006
- [2] Gerd Keiser, Optical fiber communication, Fifth Edition McGraw Hill Education (India), 2013
- [3] Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks : A Practical Perspective", Harcourt Asia Pte Ltd., Second Edition 2004.
- [4] C. Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks : Concept, Design and Algorithms", Prentice Hall of India, 1st Edition, 2002

List of Practical Assignments:

- To set-up a fiber optic analog link
- To set up a fiber optical digital link
- To obtain intensity modulation of an analog signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- To obtain intensity modulation of a digital signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- To study the frequency modulation in case of fiber optic communication system.
- To undertake the pulse width modulation in case of fiber optic communication system.
- To determine the propagation losses in case of optical fiber communication system.
- To evaluate bending losses in case of optical fiber communication system.
- To determine the numerical aperture of an optical fiber
- To study the characteristics of frequency modulation in case of fiber optic communication system.
- To plot the electrical to optical conversion characteristics

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR8C3 SATELLITE AND NAVIGATION SYSTEM	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

The curriculum focuses on following learning objectives:

- To get acquainted with satellite communication system and its importance.
- To understand the concepts of satellite orbit, launching mechanisms, launch vehicles, types of satellites and various access techniques

Prerequisite: Knowledge of Digital Communication and Wireless Communication

COURSE CONTENTS

UNIT-I

Introduction to Satellite Communication: Evolution of satellites and launch vehicles, basic concept and overview of satellite communication system, comparison with other communication system, various types of satellites and their applications, recent trends in satellite communication system.

Orbital Mechanics: Orbit and trajectories, Orbiting satellites: basic principles and equation of the orbit, Orbital parameters: definition and calculation, injection velocity and resulting satellite trajectories, types of satellite orbits.

UNIT-II

Satellite Launch and In-orbit Operations: Launch sequence and its types, launch vehicles, orbital perturbations: longitudinal and inclination changes, satellite stabilization, orbital effects on communication system performance, look angles: definition and determination, sub satellite point, calculation of elevation and azimuth angle, specialization to geostationary satellite, visibility test.

The Space Segment: Satellite sub systems, Altitude and orbit control system, telemetry, tracking, command and monitoring, power system, communication subsystems-transponders, satellite antennas, space qualification and equipment reliability.

UNIT-III

Satellite Link Design: Basic transmission theory, Link parameters, frequency considerations, propagation considerations- Introduction, atmospheric losses, ionospheric effects, rain

attenuation, other propagation impairments, noise considerations, interference related problems, G/T ratio, C/N ratio, Link Design: design procedure and link budget, design of uplink and downlink, combined uplink and downlink C/N ratio, link budget examples for C band, Ku band and Ka band.

The Earth Segment: Earth station, types of earth station, architecture of Earth station, Earth station Design considerations and optimization.

UNIT-IV

Modulation and Multiplexing Techniques for Satellite Links: Amplitude modulation, frequency modulation, Carson's rule, analog FM transmission by satellite, digital modulation and demodulation, Digital transmission of analog signal, multiplexing techniques: Frequency division multiplexing and time division multiplexing.

Satellite Access: Introduction to multiple access techniques, Frequency division multiple access: Preassigned and demand assigned, calculation of C/N ratio FDMA, Demand Assigned FDMA, Time Division Multiple access: Introduction, TDMA Frame structure, TDMA Burst structure Computing unique word detection probability, TDMA frame efficiency, Code Division Multiple Access: Frequency hopping, Time hopping.

UNIT-V

Satellite Applications: VSAT Systems-overview, network architecture, access control protocols, modulation and multiple access selection, VSAT earth station and calculation of link margin.

Low earth orbit and Non Geo –stationary satellite systems: Orbit consideration, coverage and frequency consideration, delay and throughput considerations, system considerations.

Direct Broadcast Satellite Television and Radio: Digital DBS TV system design and link budget

Satellite navigation and the Global Positioning System: Introduction, radio and satellite navigation, GPS position location principles, GPS receivers and codes-C/A code.

Learning Outcome:

After learning the course the students should be able to:

- To analyze satellite sub systems, space segment and Earth segment.
- To design communication link for various types of satellite systems.
- After learning this course student will get the knowledge of satellite link design and fundamentals, power and bandwidth requirement, effect of the transmission medium etc.
- Student will be familiar with regulatory aspects and standards, various applications of satellite and navigation system, and some value added examples.

BOOKS RECOMMENDED:

- A. Maini, V. Agrawal, "Satellite Communications", Wiley India Pvt. Ltd., 2013.
- T. Pratt, C. Bostain, J. Allnutt, 'Satellite Communications', Second Edition, John Wiley & Sons, 2003.
- M. Richharia, 'Satellite Communication Systems-Design Principles', Macmillan 2003.

List of Practical Assignments:

- Determination of orbit for a given eccentricity using Kepler's equation.
- Computing the orbit of satellite by providing the satellite orbital parameters.
- Calculation of look angle (Azimuth angle and elevation angle) with the help of given latitude and longitude of earth station as well as sub-satellite point.
- Calculation of EIRP for earth station and satellite transponder and C/N ratio at the satellite and earth station receiver.
- Obtain the autocorrelation of an input sequence applied at the Earth Station.
- Obtain the waveforms for input signal, sampled signal, time division multiplexed signal and recovered signal for satellite communication.
- Obtain the waveforms for BPSK modulation and demodulation in satellite communication.
- Obtain the waveforms for QPSK modulation and demodulation in satellite communication.
- Simulate Code Division Multiple Access for satellite communication of N transmitter/receiver pair.
- Link budget analysis of transponder by obtaining the graph of C/N ratio v/s P_t and P_r .

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E1	L	T	P	L	T	P	Total
INTERNET OF THINGS	3	1	2	3	1	1	5
Duration of Theory							
Paper: 3 Hours							

Learning Objective:

Assess the genesis and impact of IoT applications, architectures in real world.

Illustrate diverse methods of deploying smart objects and connect them to network.

Compare different Application protocols for IoT.

Infer the role of Data Analytics and Security in IoT.

Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Prerequisite: Computer Network, C Language

COURSE CONTENTS

Unit I

IoT Introduction, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit II

Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Unit III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IoT Security, Common Challenges in IoT Security, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment

Unit V

IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Learning Outcomes:

- At the end of the course, the students would be:
- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

BOOKS RECOMMENDED:

- David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 st Edition, Pearson Education
- Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.
- Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014.
- Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017.

List of Practical Assignments:

- To study the architecture of application board of Raspberry Pi.
- To demonstrate the OS (Debian) for RPi in a SD card preparation, configuration of Raspberry Pi during first booting and use of remote SSH like putty
- To demonstrate the basic linux commands on Raspberry pi.
- To create a database & Store the value in Raspberry Pi.
- To install Android on Raspberry Pi.
- To Setup R Pi first time without using screen, mouse, keyboard.
- To interface ADC at GPIOs of Raspberry Pi for measuring analog voltage.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E2	L	T	P	L	T	P	Total
NETWORK SECURITY	3	1	2	3	1	1	5
Duration of Theory							
Paper: 3 Hours							

Learning Objectives:

- To understand the fundamentals of Cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

Prerequisite: Computer Network

COURSE CONTENTS

UNIT I -

An Overview of Computer Security-Security Services-Security Mechanisms-Security Attacks- Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT II-

Classical Cryptography- Substitution Ciphers-permutation Ciphers-Block Ciphers-DESModes of Operation- AES-Linear Cryptanalysis, Differential Cryptanalysis- Hash Function - SHA 512- Message Authentication Codes-HMAC - Authentication Protocols.

UNIT III-

Introduction to Public key Cryptography- Number theory- The RSA Cryptosystem and Factoring Integer- Attacks on RSA-The ELGamal Cryptosystem- Digital Signature Algorithm-Finite Fields-Elliptic Curves Cryptography- Key management – Session and Interchange keys, Key exchange and generation-PKI.

UNIT IV -

Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem Secure Software Development: Secured Coding - OWASP/SANS Top

Vulnerabilities Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference – Application Controls.

UNIT V -

Secret Sharing Schemes-Kerberos- Pretty Good Privacy (PGP)-Secure Socket Layer (SSL)- Intruders – HIDS- NIDS - Firewalls - Viruses

Learning Outcomes:

- At the end of this course, students will be able to:
- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures.
- Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations.
- Formulate research problems in the computer security field.

BOOKS RECOMMENDED:

- William Stallings, “Cryptography and Network Security: Principles and Practices”, Third Edition, Pearson Education, 2006.
- Matt Bishop, “Computer Security art and science”, Second Edition, Pearson Education, 2002.
- Wade Trappe and Lawrence C. Washington, “Introduction to Cryptography with Coding Theory” Second Edition, Pearson Education, 2007.
- Jonathan Katz, and Yehuda Lindell, Introduction to Modern Cryptography, CRC Press, 2007.
- Douglas R. Stinson, “Cryptography Theory and Practice”, Third Edition, Chapman & Hall/CRC, 2006.

List of Practical Assignments:

- 1) Design and implementation of a simple client/server model and running application using sockets and TCP/IP.
- 2) To make students aware of the insecurity of default passwords, printed passwords and password transmitted in plain text.
- 3) To teach student how to use SSH for secure file transfer or for accessing local computer using port forwarding technique.
- 4) Comparison between Telnet and SSH for Secure Connection

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E3	L	T	P	L	T	P	Total
ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY	3	1	2	3	1	1	5
Duration of Theory							
Paper: 3 Hours							

Learning Objective: The purpose of this course is to expose the students to the basics and fundamentals of Electromagnetic Interference and Compatibility in System Design.

Prerequisite: EMF and Transmission line

COURSE CONTENTS

UNIT 1 EMI environment

Concepts of EMI and EMC and Definitions, Sources of EMI , Celestial Electromagnetic noise-Lightning Discharge, Electrostatic Discharge, Electromagnetic Pulse, Electromagnetic emissions-Noise from relays and Switches, Nonlinearities in Circuits

UNIT 2 EMI COUPLING PRINCIPLES

Capacitive coupling , Inductive coupling, Common Impedance Ground Coupling, Ground Loop coupling, Transients in power supply lines, Radiation coupling, Conduction coupling, Common – mode and Differential-mode interferences, Conducted EM noise on power supply lines

UNIT 3 EMI MEASUREMENTS

Open Area test site measurements-Measurement precautions , Open -Area test site, Anechoic Chamber, TEM-Reverberating TEM-GTEM cell , Comparisons

UNIT 4 EMI CONTROL TECHNIQUES

EMC Technology, Grounding, Shielding, Electrical Bonding, Power line filter, CM filter, DM filter, EMI suppression Cables, EMC Connectors ,Isolation transformer

UNIT 5 EMI / EMC STANDARDS

Introduction- Standards for EMI/EMC, MIL-STD-461/462-IEEE/ANSI standard-CISPR/IEC standard, FCC regulations, British standards, VDE standards-Euro norms, Performance standards-some comparisons.

Learning Outcome:

- After learning the course the students should be able to know about:
- EMI Environment
- EMI Coupling and Measurements
- EMI control techniques and standards

BOOKS RECOMMENDED:

- Prasad Kodali ,“Engineering Electromagnetic Compatibility –Principles, Measurements, and Technologies”, IEEE press.
- Henry W. Ott , “Noise Reduction Techniques in Electronic Systems”- 2nd Edition-John Wiley & Sons.
- Bernharo Q’Keiser, ‘Principles of Electromagnetic Compatibility’, Artech house, 3rd edition, 1986

List of Practical Assignments:

The practical will be based on various EMI reduction techniques like Grounding, Shielding, Electrical Bonding, Power line filter, CM filter, DM filter, EMI suppression Cables etc.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E4	L	T	P	L	T	P	Total
DBMS AND DATA ANALYTICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the need of databases, its architecture and schemas.
- To familiarize students with representing domains using entity-relationship modelling. How to design a normalized schema in the relational data model.
- Develop skills in students to implement schema and query using SQL.
- Develop ability to develop database applications based on the requirements.

Prerequisites: Knowledge of Data Structures and Computer Programming and some topics of operating systems

COURSE CONTENTS

Unit-I Introduction: Database Environment:

Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit-II Database Analysis & Modeling:

Introduction to Data Analysis and Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs- Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues.

Unit-III Database Design:

Introduction to Logical Database Design, Relational Data Model – Codd's Rules, Relational Algebra etc.; Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc.

Unit-IV System Implementation & Transaction Processing:

Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs - Views, Triggers, Cursors etc; Transaction

Processing – Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking etc.

UNIT V- Introduction to Big Data Platform:

Challenges Of Conventional Systems – Web Data – Evolution Of Analytic Scalability, Analytic Processes And Tools, Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference And Bayesian Networks, Support Vector And Kernel Methods, Analysis Of Time Series: Linear Systems Analysis, Nonlinear Dynamics – Rule, Introduction To Streams Concepts – Stream Data Model And Architecture – Stream Computing, Sampling Data In A Stream – Filtering Streams – Counting Distinct Elements In A Stream – Estimating Moments – Counting Oneness In A Window – Decaying Window – Realtime Analytics Platform(RTAP) Applications

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the fundamentals of relational database system including: data models, database architectures and database manipulations.
- Understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using DBMS such as MySQL.
- Be familiar with managing database systems.
- Understand new developments and trends in databases.

BOOKS RECOMMENDED:

- Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
- Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
- [3]. A First Course in Database Systems, By J. Ullman, J. Widom, 3rd Edition, Pearson Education, 2014.
- Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.
- Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
- MySQL : The Complete Reference, 1st Edition, McGraw Hill Education, 2004.

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Designing an E-R model.
2. Solving basic SQL assignments.
3. Solving intermediate SQL assignments involving Nested and Join queries.
4. Using PL/SQL constructs involving procedures, triggers, views etc.
5. Exploring how transaction processing is handled by MySQL.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E5	L	T	P	L	T	P	Total
MACHINE LEARNING	3	1	2	3	1	1	5
Duration of Theory							
Paper: 3 Hours							

Learning Objectives: The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better

Prerequisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE CONTENTS

Unit-I Introduction:

Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II Supervised Learning:

Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III Unsupervised Learning:

Introduction to unsupervised learning -Clustering - Classification of clustering algorithms, Computational Learning theory, PAC Learning, VC dimension. Artificial Neural Networks Learning: Neural Network Representation, Perceptron, Backpropagation algorithm.

Unit-IV Language Learning:

Classification problems in language: word-sense disambiguation, Formal Language learning, introduction to Hidden Markov models (HMM's).

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators..)

Unit-V Genetic Algorithms (GAs):

Motivation, Representing Hypotheses, Genetic operators, fitness Function and Selection, Working of Genetic Algorithm, Evolutionary Programming and Genetic Programming, Case studies of Machine Learning data sets .

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

BOOKS RECOMMENDED:

- [1].Tom Mitchell, Machine Learning, McGraw-Hill, 1997.
- Richard O. Duda, Peter E. Hart & David G. Stork, Pattern Classification, Wiley & Sons, 2001.
- Ethem Alpaydin, Introduction to Machine Learning, MIT Press, 2004.
- David E. Goldberg, Genetic Algorithms in Search, Optimization and Machine Learning, Kluwer Academic Publishers, Boston, MA, 1989.
- Zbigniew Michalewicz, Genetic Algorithms + Data Structures = Evolution Programs, Springer, 1999.

List of Practical Assignments:

List of Assignment in Machine Learning Lab:

- 1) Problem based on different machine Learning algorithm
- 2) Works on different machine learning Tools
- 3) Case Study on different data sets

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8G1	L	T	P	L	T	P	Total
Introduction to photonics	3	0	0	3	0	0	3
Duration of Theory							
Paper: 3 Hours							

The Above Course ETR8G1 Introduction to photonics is as per the course available at

**MOOC/SWAYAM Course - I
Applications**

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8G2	L	T	P	L	T	P	Total
Cryptography & Network Security	3	0	0	3	0	0	3
Duration of Theory Paper: 3 Hours							

The Above Course ETR8G1 Introduction to photonics is as per the course available at

MOOC/SWAYAM Course - I
Applications

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

B.E Civil Semester-VIII (Regular Mode)

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	VLR8P2	Project Phase - II	--	0-0-7	7
2.	VLR8C1	Design of Hydraulic And Irrigation Structure	PE	3-1-1	4+1(P)
3.	VLR8C2	Building Planning & Architecture	PE	3-1-1	4+1(P)
4.	VLR8EX	--	PE	3-1-1	4+1(P)
5.	VLR8G6	Construction Techniques	GE	3-1-0	4
6.	VLR8V8	Comprehensive Viva - VIII	Virtual	0-0-4	4
TOTAL CREDITS					30
Programme Electives for VIII Semester					
4	VLR8E1	Disaster Modelling and Management	PE	3-1-1	4+1(P)
4	VLR8E2	Design of Pre Stressed Concrete	PE	3-1-1	4+1(P)
4	VLR8E3	Instrumentation and Experimental	PE	3-1-1	4+1(P)
4	VLR8E4	Design of Earthquake Resistant Structures	PE	3-1-1	4+1(P)

(Internship Mode)

S No	Sub_Code	Sub_Name	Type	L-T-P	Credits
1.	VLR8I1	Industry Internship	--	0-0-18	18
2.	VLR8G1	Theory and Practice of Non Destructive Testing	PE	4-0-0	4
3.	VLR8G2	Earth Sciences for Civil Engineering Part - I & II	PE	4-0-0	4
4.	VLR8VI	Comprehensive Viva - VIII	Virtual	0-0-4	4
TOTAL CREDITS					30

Devi Ahilya University, Indore, India			
Institute of Engineering & Technology			
Subject code and name	Type	L-T-P	Credits
VLR8C1 : Design of Hydraulic And Irrigation Structure	L	T	P
	PE	3-1-1	4+1(P)

Learning Objective: The course aims to motivate student to perform the practical and having a research oriented approach toward the design of hydraulic and irrigation structure

COURSE CONTENTS

Unit - I

Introduction - Classification of dams, Gravity dams, Earth dams, Arch dam, Buttress dam, Steel dams, Timber dams, selection of site for dam, selection of type of dam, investigations of dam sites, Engineering surveys, Geological investigations, Types of hydropower plants, site selection for power plant, General arrangement of a hydropower project.

Unit - II

Principles of Design of Hydraulic Structures - Hydraulic structures on permeable foundations, Theories of subsurface flow, Khosla's method of independent variables, Exit gradient, Location of Hydraulic jump, water surface profiles, scour due to subsurface flow, Design Principles, Energy dissipation principles.

Unit - III

Gravity Dams - Types of storage head works, Forces acting on gravity dams, Analysis of gravity dams, Profile of a gravity dam, Finite Element Method, Design of gravity dam, joints in gravity dam, Galleries in gravity dam, Adits and shafts, Construction of gravity dam, Foundation Grouting, Instrumentation of gravity dams.

Unit - IV

Earth dams - Types of earth dams, Causes of failure of earth dams, Seepage analysis, phreatic line, flow net construction, criteria for safe design of gravity dams, typical cross sections of earth dams, Stability analysis, Seepage control, design of filters.

Unit - V

Spillways and energy dissipation systems - Essential requirements of spillways, Required spillway capacity, component parts of spillway, Types of spillways, Design of Ogee spillway, Design of shaft spillway, Design of siphon spillway, Design of stilling basins. Hydropower structures - Storage power plant, Runoff River plant, Pumped storage plant, Water conveyance systems, Tunnels and Penstocks, Gates, Surge tanks, Power house layout.

Learning Outcomes: After the completion of course the student will be able to

- Understand the basic structure of Dam technology and can work on same .
- Understand the basic cause of failure of dam and can work on it

Reference Books: -

- [1] Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
- [2] Hydroelectric Hand Book by Creager

[3] Hydraulic Structures by Varshney

[4] Irrigation & Water Power Engg. by Punmia & Pandey

[5] Water Power Engineering by Dandekar

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR8C2 Building Planning & Architecture	L	T	P	L	T	P	Total
	3	1	1	3	1	1	4+1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To have the knowledge of various building components.
- To understand the fundamental principles and concepts of planning and architecture for buildings.
- To study about different views of layout.
- To learn the development controls covered by building bye laws and national building code for buildings.

COURSE CONTENTS

UnitI

Drawing of Building Elements- Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UnitII

Building Planning- Classification of buildings, Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks, FAR terminology, Design and drawing of Building, Design concepts and philosophies, Preparing sketch plans and working drawings of various types of buildings like residential building, institutional buildings and commercial buildings, site plans, presentation techniques, pictorial drawings, perspective and rendering, model making, introduction to computer aided design and drafting, Applying of principle of architectural composition (i.e. unity, contrast, etc.), Principles of planning, orientation in detailed drawings.

UnitIII

Building Services- Introduction of Building Services like water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems, principles of internal & external drainage systems, principles of electrification of buildings, intelligent buildings, elevators & escalators their standards and uses, air-conditioning systems, fire fighting systems, building safety and security systems, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UnitIV

Principles of architectural composition- Unity, balance, proportion, scale, rhythm, harmony, accentuation and contrast. Organising Principles in architectural- Symmetry, hierarchy, axis, linear, concentric, radial, and asymmetric grouping, primary and secondary masses, Role of colour, texture, shapes/forms in architecture. Architectural space and mass, visual and emotional effects of geometric forms, space activity and tolerance space. Forms related to materials and structural systems. Elements of architecture : Functions – Pragmatic utility , circulatory function, symbolic function, Physiological function. Structure – Physical structure, Perceptual structure.

UnitV

Concepts of master plan, structure plan, detailed town planning scheme and action plan, estimating future needs - planning standards for different land use, allocation for commerce, industries, public amenities, open areas etc., planning standards for density distributions, density zones, planning standards for traffic network, standard of roads and paths, provision for urban growth, growth models, plan implementation, town planning legislation and municipal acts, panning of control development schemes, urban financing, land acquisition, slum clearance schemes, pollution control aspects

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Comprehend local building bye-laws and provisions of National Building Code in respect of building and town planning.
- Discuss various aspects of principles of planning and architecture in planning building and mass composition.
- Explain the principles of planning and design considerations to construct earthquake resistant building.
- Prepare working drawings, foundation plans and other executable drawings with proper details for residential buildings.

Reference Books: -

- [1] Shah, Kale & Patki; Building Design and Drawing; TMH
- [2] Malik & Meo; Building Design and Drawing
- [3] W B McKay, Orient Blackswan Building Construction Vol 1 -4, Pearson
- [4] Gurucharan Singh and Jagdish Singh, Building Planning, Designing and Scheduling, Standard Publishers Distributors.
- [5] Loyal JS, Dongre A, Building Design and Drawing, Satya Prakashan
- [6] Ghose D.N., Civil Engineering Design and Drawing, CBS publisher
- [7] Das B M, Principles of Foundation Engineering, Cengage Learning.
- [8] Agrawal S. C., Architecture and Town Planning, Dhanpat Rai & Co.
- [9] S.C. Rangwala, Town Planning, Charotar Publishing House.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
VLR8E1 Disaster Modelling & Management	3	1	0	3	1	0	3
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Learning Objectives:

- To spell out the need for better disaster management which may help to bring relief immediately to the victims of the tragedy.
- To understand and appreciate the nature of disaster management, in its pre-disaster, during disaster and post disaster phases.

Unit - 1

Disasters: Definition- Hazard Risk, Mitigation, Natural and human-induced disasters types of hazards, disasters and catastrophes – Disaster Management.

Unit - 2

Hydrological Hazards: Cyclone – damage assessment- Flooding: Topography, land use and flooding– flood prone area analysis and management Tsunami and floods.

Unit - 3

Drought- types of drought, -factors influencing drought - delimiting drought prone areas - drought index, SPI and Palmer.

Unit - 4

Geological Hazards: Earthquakes; location, faults, causes, types, associated hazards and impacts, Richter scale and Modified Mercalli scale. Important examples from India. Structural damage and its prevention - Dams and earthquakes.-Tsunamis - earthquake induced landslide. Geomorphic Hazards: Mass movements: Definition of landslides, causes, debris flows, landslides in soil and rock, slope stability analysis.

Unit - 5

Mitigation and Management: Hazard, Risk and Vulnerability mapping and modeling using GIS. Case studies for earth quake zonation.Preparedness- GIS case studiesfor earthquake, landslide–risk assessment–GIS case studies for earthquake, landslide and cyclones. Emergency Management Systems (EMS) in the Disaster Management Cycle.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Know the types of Disasters and its triggering factures.
- Understand the stages of emergency management and GIS capabilities and kinds of data are required to support emergency management work during the disasters.
- Assess the potential of new, evolving GIS technologies to meet vulnerability mapping, modeling and emergency management needs.

- Develop a report or project proposal that identifies or responds to needs for GIS solutions in emergency management.

Books & References Recommended:

- [1] National Disaster Management Division (2004) Disaster Management in India - A Status Report, Ministry of Home Affairs, Government of India, New Delhi.
- [2] UNDRO (1995) Guidelines for Hazard Evaluation Procedures, United Nations Disasters Relief Organization, Vienna.
- [3] Nagarajan, R., (2004) Landslide Disaster Assessment and Monitoring, Anmol Publications, New Delhi.
- [4] Ramkumar, Mu, (2009) Geological Hazards: Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi.
- [5] Arnold M et.al Ed. (2006) Natural Disaster Hotspots:Case Studies. The World Bank Hazard Management Unit Washington, D.C.204p.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR8E2 Design Of Prestressed Concrete Elements	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	3

Learning Objectives:

- To understand the property of different concrete and study their behavior under different conditions.
- To use concrete in a perfect way to optimize its strength

COURSE CONTENTS

Unit - 1

Principles of prestressing - Materials of prestressing - Systems of prestressing - Loss of prestress - Deflection of Prestressed Concrete members.

Unit - 2

Slabs - Pre-tensioned and Post-tensioned beams - Design for flexure, bond and shear - IS code provisions - Ultimate flexural and shear strength of prestressed concrete sections - Design of end anchorage zones using IS code method.

Unit - 3

Composite beams - Analysis and design. Partial prestressing - non-prestressed reinforcements.

Unit - 4

Analysis of Continuous beams - Cable layout - Linear transformation - Concordant cables.

Unit - 5

Design of compression members and tension members. Circular prestressing - Water tanks - Pipes - Analysis and design - IS Codal provisions.

Course outcomes:

On completion of the course, the students will be able to:

- Design a pre-stressed concrete beam accounting for losses.
- Design the anchorage zone for post tensioned members.
- Design composite members. Design continuous beams.

Books & References Recommended:

- [1] 1.Lin. T.Y., Burns, N.H., Design of Prestressed Concrete Structures, John Wiley & Sons, 1982.
- [2] 2. RajaGopalan N. Prestressed Concrete, Narosa Publishing House, New Delhi, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Civil Engineering)				
Subject Code & Name	Instructions Hours per Week			Credits			
VLR8E3 Instrumentation and Experimental Techniques	L	T	P	L	T	P	Total
	3	1	1	3	1	1	4+1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the generalized system of three stages, Calculation and sensitivity.
- To use Accuracy and Precisions in best way the student can.

COURSE CONTENTS

Unit - 1

Generalised Measurement Systems : Purpose and methods of measurements, Generalised system of three stages, Calculation and sensitivity. Standards of measurements of various quantities. Legal Status of Standards. Classification of first stage, Basic Detector - Sensor Element, Transducers and Devices, Mechanical and Electrical Members as a Primary Detectors, Advantages of Electrical - System Elements, Introduction of different types of Sensors.

Unit - 2

Statistical Treatment of Data : Accuracy and Precisions, Reliability of Data. Classification of Errors – Systematic and Random Errors. Treatment of Multi Sample Data. Mean, Mode and Medians as Measures of Central Tendency. Standard Deviation and Normal Distribution. Error Estimates based on Normal Distribution. Confidence Limits. 2 -Tests.

Unit - 3

Measurement of Elastic Strains : Mechanical, Optical, Acoustic, Pneumatic and Electrical Strain Measuring Devices, Electrical Resistance, Strain Gauges - Wire and Foil Type. Construction Application and their Characteristics. Potentiometric and Wheatstone Bridge Circuit and Modifying Devices. Strain Rossets. Analysis of Data.

Unit - 4

Introduction to Moire Fringe's Technique, Stress Analysis by Photoelasticity : Optical Theory. Stress-Optic Relationship. Polariscope and Photoelastic Materials. Determination of Isoclinics and Isochromatics, Separation Techniques and Fractional Fringe Order.

Unit - 5

Determination of Model Studies : Models for Investigation and Verification. Design of Models, Principles of Similitude. Material Scale Factor, Load Scale Factor and Geometric Scale Factors. Correlation of Model Studies and Prototype Behaviour. Distribution. Analysis of Crack Pattern, Photoelastic Coating. Techniques to Elastic Strain Gauges.

Course Outcomes:After the completion of course student will be able to

- Get the maximum Advantages of Electrical - System Elements
- Correlate the prototype and its implementation
- Can optimize the use of material on the basis of study of its property.

Books & References Recommended:

- [1] Jain R.K., Mechanical & Industrial Measurements
- [2] Dally & Riley, Experimental Stress Analysis.
- [3] Shrinath L.S., Experimental Analysis
- [4] Buck & Beckwith, Mechanical Measurements.
- [5] Sirohi & Radhakrishan, Mechanical Measurements.
- [6] Dove & Adams, Experimental Stress Analysis.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
VLR8E4 Design Of Earth Quake Resistant Structure	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the generalized system used for design of earthquake resistance system.

COURSE CONTENTS

Unit - 1

Elements of Earthquake Engineering: Earthquake magnitude and intensity, Focus and Epicentre, Causes and Effects of Earthquakes, Characteristics of Earthquake, Seismic zone mapping.

Unit - 2

Structural Systems For Seismic Resistance:

Structural systems – building configuration, frames, walls, dual systems – response in elevation – plan – influence of structural classification Concepts of seismic design.

Unit - 3

Analysis for Earth Quake Loads: IS: 1893-2002- Seismic Coefficient method- modal analysis Applications to multi-storied building frames – water tanks – chimneys.

Unit - 4

Ductile Detailing: Ductility of R.C structures- Confinement- detailing as per IS-13920-1993- moment redistribution – principles of design of beams, columns – beam column joints – soft story concept.

Unit - 5

Base Isolation: Isolation systems – Effectiveness of base isolation.

Course Outcomes: At the end of the course, the student will be able to:

- Apply seismic coefficient and response spectrum methods for analysis of multi storied buildings
- Apply concepts of ductility in the design of multi-storeyed structures
- Analyse a water tank structure based on latest earthquake code

Books Recommended

- [1] Pankaj Agarwal and Manish Shrikhande, Earthquake resistant design of structures, PHI 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Civil Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR8G6 Construction Techniques	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objectives:

- To give an experience in the implementation of new technology concepts
- To understand the use of form work and temporary structure.
- To Create awareness about construction practices for sub structures under various conditions..
- To Study process of repair and rehabilitation of structures.

COURSE CONTENTS

UNIT –I

Formwork and Temporary structures : Scaffolding – Definition, Component, parts, Types of scaffolding, Shoring – Definition, Types, Raking, flying and dead shores, Underpinning: definition, Purpose, Types, Pit Methods, Pile Method. Form work: Definition – Materials used Requirements of a good formwork , Form work for column, RC beams and RC slab.

UNIT II

Sub Structure Construction : Box Jacking -pipe jacking - diaphragm walls types and methods - piling techniques - driving well and caisson – sheet piles – construction procedures and applications-cofferdam - methods -cable anchoring and grouting - laying operations for built up offshore system - shoring for deep cutting - well points - dewatering and stand by plant equipment for underground open excavation - Trenchless Technology.

UNIT III

Common Strengthening Techniques

Mud Jacking grout through slab foundation - micro piling for strengthening floor and shallow profile pipeline laying - protecting sheet piles, screw anchors - sub grade water proofing - under pinning , crack stabilizing techniques ,advanced techniques. Explosives and its classification. Sequenceindemolitionand dismantling.

UNIT IV

Construction of Earthquake Resistant Building Planning of earthquake resistant building,

Construction of walls – provision of corner reinforcement, construction of beams and columns, Base

isolation. Expansion and construction, joints in buildings,

UNIT- V

Repair And Rehabilitation Of Structures: Diagonising the cause and damage-identification of different types of structural and non structural cracks – repair and rehabilitation methods for Masonry Concrete and Steel Structures. Guniting and grouting, use of epoxy and crack fills. Settlement- causes and remedial measures, plinth protection – necessity and materials used.

Course Outcome: After the completion of course the student will be able to

- Diagnosing the cause and damage and different types of cracks in the structure.
- Research over the different structures and can lead to new results.

Books & References:

- [1] Mohan Rai & M.P. Jai Singh; Advance in Building Materials & Construction,.
- [2] S.C. Rangwala; building construction.
- [3] Sushil Kumar; Building Construction,
- [4] B.C. Punmia; Building Construction ,.
- [5] Roy Chudley, Roger Geeno ,”Advanced Construction Technology” Latest Edition, 2005.
- [6] Gahlot .P.S & Sanjay Sharma ,”Building repair and maintenance management“ , CBS
- [7] Publications.2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR8G1 Theory & practice of non destructive Testing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	4	0	0	4	0	0	4

The Above Course VLR8G1 Theory & Practice of Non Destructive Testing is as per the course available at

MOOC/SWAYAM Course - I
Applications

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR8G2 Earth science for Civil Engineering Part-I & Part-II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	4	0	0	4	0	0	4

The Above Course VLR8G2 Earth Science For Engineering Part-I & Part-II is as per the course available at

MOOC/SWAYAM Course - I
Applications

They will be offered in self study/ MOOCS mode for students who have opted for internship and went at other institutions/organization.

**DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY**



FACULTY OF ENGINEERING

List Of PO_PSO (CBCS)

**M.Sc. (Applied Mathematics)
(Specialization in Computing & Informatics)
Batch 2015– 2016 and onwards**

(www.iet.dauniv.ac.in)

**DEVI AHILYA VISHWAVIDYALAYA, INDORE
INSTITUTE OF ENGINEERING & TECHNOLOGY**

**Proposed Scheme for CBCS of
M.Sc. (Applied Mathematics)
with specialization in Computing and Informatics
Batch 2015– 2016 and onwards
(Subject to Revision)**

SEM I				
S.No.	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM1PC1	Algebra	3-1-0	Core
2.	AM1PC2	Discrete Mathematics	3-1-0	Core
3.	AM1PC3	Numerical Analysis / Integral Equations	3-1-0	Core
4.	AM1SS1	Advanced Communication Skills	2-0-0	Skill
5.	AM1GEx	Generic Elective I	3-1-0	Generic
6.	AM1PR1	Computer Lab-I (MATLAB)	0-0-2	Practical
7.	AM1CV1	Comprehensive Viva I	0-0-4	Viva
Total Credit for SEM I			20 actual + 4 Virtual credits	
		List of Generic Elective I		
1.	AM1GE1	Computer Architecture/ Digital Electronics and Computer Organization	3-1-0	
2.	AM1GE2	Advanced Special Functions	3-1-0	
3.	AM1GE3	Financial Accounts	3-1-0	

SEM II				
S.No.	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM2PC1	Real Analysis / Measure Theory	3-1-0	Core
2.	AM2PC2	Advanced Differential Equations	3-1-0	Core
3.	AM2PC3	Theory of Computation	3-1-0	Core
4.	AM2ECx	Discipline Elective I	3-0-0	Disc. Elec.
5.	AM2EMx	Discipline Elective II	3-0-0	Disc. Elec.
6.	AM2PR2	Computer Lab-II (Of Subject of Discipline Elective -I)	0-0-2	Practical
7.	AM2CV2	Comprehensive Viva II	0-0-4	Viva
Total Credit for SEM II			20 actual + 4 Virtual credits	
		List of Discipline Elective I		

1.	AM2EC1	Object Oriented Programming with Core Java	3-0-0	
2.	AM2EC2	Comp. Graphics /Multimedia	3-0-0	
		List of Discipline Elective II		
1.	AM2EM1	Operations Research-I	3-0-0	
2.	AM2EM2	Soft Computing Techniques	3-0-0	

(PTO)

SEM III				
S.No.	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM3PC1	Topology	3-1-0	Core
2.	AM3PC2	Database Theory	3-1-0	Core
3.	AM3PC3	Mathematical Statistics	3-1-0	Core
4.	AM3SS2	Life Management Skills	2-0-0	Skill
5.	AM3GEx	Generic Elective II	3-1-0	Generic
6.	AM3PR3	Computer Lab-III (Research Tools)	0-0-2	Practical
7.	AM3CV3	Comprehensive Viva III	0-0-4	Viva
Total Credit for SEM III			20 actual + 4 Virtual credits	
List of Generic Elective II			3-1-0	
1.	AM3GE1	OS/Microprocessor	3-1-0	
2.	AM3GE2	Integral Transforms	3-1-0	
3.	AM3GE3	Financial Management		

SEM IV				
S.No.	Sub Code	Sub Name	Number of Credits L-T-P	Type
1.	AM4PC1	Complex Analysis	3-1-0	Core
2.	AM4PC2	Analysis of Algorithm	3-1-0	Core
3.	AM4PC3	Functional Analysis	3-1-0	Core
4.	AM4ECx	Discipline Elective III *	3-0-0	Disc. Elec.
5.	AM4EMx	Discipline Elective IV *	3-0-0	Disc. Elec.
6.	AM4Dxx	Discipline Elective V *	0-2-4	Diss. Work
7.	AM4PR4	Computer Lab-IV (Of Subject of Discipline Elective -III)	0-0-2	Practical
8.	AM4CV4	Comprehensive Viva IV	0-0-4	Viva
Total Credit for SEM IV			20 actual + 4 Virtual credits	
List of Discipline Elective III				
1.	AM4EC1	Advanced Java	3-0-0	
2.	AM4EC2	Unix / Linux Administration	3-0-0	
3.	AM4EC3	Computer Network/ Internet & Web Technology	3-0-0	
List of Discipline Elective IV				
1.	AM4EM1	Operations Research-II	3-0-0	
2.	AM4EM2	Mathematical Modeling	3-0-0	
3.	AM4EM3	Number Theory/Cryptography	3-0-0	
List of Discipline Elective V				
1.	AM4DW1	Dissertation (Minor)*	0-0-4	
2.	AM4DS1	Seminar	0-2-0	

Program Outcomes (POs)
Master of Sciences

A Master of Science student will be able to:

PO1: Create more interest in the subject and motivated towards self-learning.

PO2: Strengthen the logical reasoning, which is the main ingredient to understand subjective concepts and to inculcate the habit of making observations and experimentation and arrive at the final result.

PO3: Acquire the communication skill to take up a career in either Teaching their subject at various levels including schools, colleges, universities, etc or as a researcher and analyst or in professional courses.

PO4: Communicate effectively both orally and in writing, work effectively in teams, exhibit ethical and professional behaviour.

PO5: Demonstrate knowledge and understanding of the underlying principles and apply these to one's own work, as a member and leader in a team, manage projects in multidisciplinary environments.

PO6: Propose new questions and suggest possible software packages and/or computer programming to find solutions to these questions.

PO7: Identify, formulate, research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematical, biological, physical and chemical sciences, programming and so on.

Program Specific Outcomes (PSOs)
M.Sc. Applied Mathematics (with specialization in Computing and Informatics)

The post graduates of the M.Sc. Applied Mathematics (with specialization in computing and Informatics) will:

PSO1: Develop core skills in Applied Mathematics and methods that find use in science, engineering, business, computer science, and industry. And allows to specialise in industrial modelling or numerical analysis, in preparation for study towards a PhD or a career using Mathematics within industry.

PSO2: Be enriched with analytical skills, problem solving and communication skills as well as independently design, develop and implement computer applications.

PSO3: Enhance career opportunities and bring themselves at par with professional courses.

Devi Ahilya Vishwavidyalaya, Indore
Institute of Engineering & Technology

Sub: Minutes of Departmental Committee Meeting held on 5/12/2018

1. Departmental Committee members discussed the revision of syllabus for all subjects of BE, ME and MSc Courses implemented under Choice Based Credit System. Syllabus of all subjects were changed according to the Industry needs and on the basis of feedback from the alumni of IET. New subject codes were assigned to the subjects under all schemes and percentage change is noted by the committee.
2. Departmental Committee agreed to adopt the program outcomes of NBA for all six BE ^{SME} courses being conducted at IET.
3. Program Specific outcomes for all 6 BE ^{SME} programs, prepared by the departments are adopted by the departmental committee of IET
4. All departments finalized the syllabus of 8th Sem, for all BE courses being conducted at IET.



Dr. Paresh Atri



Dr. G. L. Prajapati

Dr. G. Maheshwari



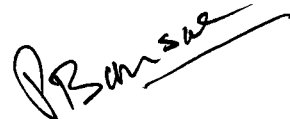
Dr. N. Sohoni



Dr. Mrs. M. Sharma



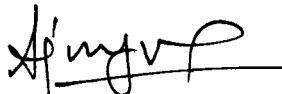
Dr. Ravi Sindal



Dr. Pratosh Bansal



Dr. Shashi Prakash



Dr. Ajay Verma



S.V. Tokekar
5-12-18

Dr. Sanjiv Tokekar

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

List of PO_PSO_CBCS)

**BE Programme
(MECHANICAL ENGINEERING)
Effective from July 2015**

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

1. Bachelor of Engineering (B.E) in Mechanical Engineering

PSO1: Excellence in Thermal, Design & Industrial & Production Engineering by acquiring knowledge in concept of Thermal Systems, Selection of Materials, Stress Analysis, Layouts and Product Design.

PSO2: Graduate will be able to analyse, interpret and provide solutions to the real life Mechanical Engineering problems.

PSO3: Ability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

DEVI AHILYA VISHWAVIDYALAYA, INDORE

Institute of Engineering & Technology, Devi Ahilya University, Indore, (M.P.), India. (Scheme Effective from July 2016)



FACULTY OF ENGINEERING

List Of_PO_PSO (CBCS) Computer Engineering

BE I Year-IV Year Programme

Effective from July 2015

INSTITUTE OF ENGINEERING & TECHNOLOGY

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

- PO1. Engineering knowledge:** Apply the knowledge of mathematics engineering²⁰¹⁶) fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

. Bachelor of Engineering (B.E) in Computer Engineering

PSO1: An ability to apply knowledge of computing appropriate to the discipline, also to analyze a problem, and identify and define the computing requirements appropriate to its solution.

PSO2: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the emerging trends in industrial/research settings and thereby innovate novel solutions to existing problems.

PSO3: An ability to use current techniques, skills, and tools necessary for computing practices in an effective manner, and to apply design and development principles in the construction of software systems of varying complexity.

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

List Of PO_PSO
Electronics and Instrumentation

BE Programme
(Electronics and Instrumentation)
Effective from July 2015

INSTITUTE OF ENGINEERING & TECHNOLOGY

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

3. Bachelor of Engineering (B.E) in Electronics and Instrumentation Engineering

PSO1: Ability to perform instrumentation and data acquisition in various process industries for better product development and improved quality.

PSO2: Ability to apply the concept for accurate and precise measurement of parameters for investigation and analysis in medical domain.

PSO3: Ability to establish sensor networking system to exchange the information, signal processing and data base management for the development of IOT and futuristic applications.

PSO4: Ability to understand the concepts and applications in the field of embedded systems and VLSI technology in analysis, design, and development of various types of electronic systems.

PSO5: Ability to use ICT and EDA tools (both software and hardware) for the design and analysis of complex electronic systems for providing solution to real world problem and doing research activities.

PSO6: Developing excellent skills to communicate in both oral and written forms, having good interpersonal and analytical skills as a leader in a team, following good professional ethics with appreciation of societal responsibilities.

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

List of PO_PSO(CBCS)

**BE Programme
(INFORMATION TECHNOLOGY)
Effective from July 2015**

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

PROGRAM OUTCOMES

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

4. Bachelor of Engineering (B.E) in Information Technology

PSO1: Impart capabilities to apply fundamental and advanced computing concepts.

PSO2: Use of capabilities for analysis, design, development and management of information processing solution(s) in solving real life problem(s).

PSO3: Capacity to adapt with continuous technological up gradations in domain of Information Technology.

PSO4: To become a socially responsible citizen with motivation to apply the gained knowledge in the domain of Information Technology for the benefit of the society.

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

List of PO_PSO

**BE Programme
(Electronics & Telecommunication)
Effective from July 2015**

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

5. Bachelor of Engineering (B.E) in Electronics and Telecommunication Engineering

PSO1: The ability to understand the concepts and applications in the field of Telecommunication/Networking, signal processing, embedded systems and VLSI technology in analysis, design, and development of various types of electronic systems.

PSO2: Ability to in using ICT and EDA tools (both software and hardware) for the design and analysis of complex electronic systems for providing solution to real world problem and doing research activities.

PSO3: The skills to communicate in both oral and written forms, good interpersonal and analytical skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

LIST OF PO_PSO (CBCS)

**BE Programme
(CIVIL ENGINEERING)**
Effective from July 2015

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

6. Bachelor of Engineering (B.E) in Civil Engineering

- a) PSO1: The graduates will have the ability to plan, analyse, design, execute and maintain cost effective civil engineering structures without over exploitation of natural resources.
- b) PSO2: The graduates of civil engineering program will have the ability to take up employment, entrepreneurship, research and development for sustainable civil society.

DEVI AHILYA VISHWAVIDYALAYA, INDORE



FACULTY OF ENGINEERING

List of PO_PSO (CBCS)

**BE Programme
(MECHANICAL ENGINEERING)
Effective from July 2015**

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

1. Bachelor of Engineering (B.E) in Mechanical Engineering

- a) PSO1: Excellence in Thermal, Design & Industrial & Production Engineering by acquiring knowledge in concept of Thermal Systems, Selection of Materials, Stress Analysis, Layouts and Product Design.
- b) PSO2: Graduate will be able to analyse, interpret and provide solutions to the real life Mechanical Engineering problems.
- c) PSO3: Ability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

**M. E. Computer Engineering (FULL TIME) With Specialization in
Software Engineering
LIST OF PO_PSO**

S. No.	Category	No. of Credits			
		SEM I	SEM II	SEM III	SEM IV
1.	Course Compulsory	15	15	-	-
2.	Generic Elective	4	4	-	-
3.	Programme Elective	5	5	-	-
4.	Skill development	2	2	-	-
5.	Seminar/ Workshop/ Research Tool	2	2	-	-
6.	Dissertation Phase	-	-	12	12
Actual Credits per Semester		28	28	12	12
Total actual Programme Credits					80
7.	Virtual Credited Comprehensive Viva	4	4	4	4
Total Credits per Semester		32	32	16	16
Total Programme Credits					96

**M. E. Computer Engineering (FULL TIME) With Specialization
in Software Engineering
LIST OF PO_PSO
Batch 2015- 2016 and Onwards**

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	SER1C1	Advanced Algorithms	3-1-1	PC1
2.	SER1C2	Object Oriented Analysis & Design	3-1-1	PC2
	SER1C3	Software Construction	3-1-1	PC3
4.	SER1Gx	Generic Elective I	3-1-0	GE1
5.	SER1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	SER1W1	Seminar/ Workshop/Research Tool	0-2-0	
8.	SER1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I			L-T-P	
1.	SER1G1	Soft Computing	3-1-0	
2.	SER1G2	Distributed Operating System	3-1-0	
3.	SER1G3	Advance Computer Architecture	3-1-0	
List of Elective I			L-T-P	
1.	SER1E1	Database Engineering	3-1-1	
2.	SER1E2	Big Data Analytics	3-1-1	
3.	SER1E3	Secure Software Engineering	3-1-1	
SEM II			L-T-P	
1.	SER2C1	Software Project Planning and Management	3-1-1	PC4
2.	SER2C2	Design Pattern	3-1-1	PC5
3.	SER2C3	Software Testing and Quality Assurance	3-1-1	PC6
4.	SER2Gx	Generic Elective II	3-1-0	GE2
5.	SER2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	SER2W2	Seminar/ Workshop/ Research Tool	0-2-0	
8.	SER2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II			L-T-P	
1.	SER2G1	Data Mining & Warehousing	3-1-0	
2.	SER2G2	Cloud Computing	3-1-0	
3.	SER2G3	Simulation and Modelling	3-1-0	
List of Elective II			L-T-P	
1.	SER2E1	Speech And Language Processing	3-1-1	
2.	SER2E2	Aspect Oriented Software Engineering	3-1-1	
3.	SER2E3	Machine Learning	3-1-1	

**M. E. Computer Engineering (FULL TIME) With
Specialization in Software Engineering
LIST OF Po_PSO
Batch 2015– 2016 and Onwards**

SEM III			L-T-P	
1	SER3D1	Dissertation Phase I	0-0-12	
2	SER3V3	Comprehensive Viva III	0-0-4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV			L-T-P	
1	SER4D2	Dissertation Phase II	0-0-12	
2	SER4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits=96	

M.E Programmes

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

PROGRAMME SPECIFIC OUTCOMES

ME Computer Engineering (Specialization in Software Engineering)

It is expected that, upon completion of the ME specialization in Software Engineering students will have the following capabilities:

Students can effectively apply software engineering practice over the entire system lifecycle. This includes requirements engineering, analysis, prototyping, design, implementation, testing, maintenance activities and management of risks involved in software systems.

Students know classical and evolving software engineering methods, can select and tailor appropriate methods for projects, and can apply them as both team members and managers to achieve project goals.

Students can apply basic software quality assurance practices to ensure that software designs, development, and maintenance meet or exceed applicable standards.

Students have effective written and oral communication skills. Students can prepare and publish the necessary documents required throughout the project lifecycle. Students can effectively contribute to project discussions and presentations.

Students will have theoretical foundations that will help them to analyzing and modelling software requirements.

ME (Information Technology) with Specialization in Information Security List of PO,PSO,CO for CBCS (Full Time)

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	ISR1C1	Advanced Algorithms	3-1-1	PC1
2.	ISR1C2	Secure Computing Techniques	3-1-1	PC2
3.	ISR1C3	Advanced Computer Networks	3-1-1	PC3
4.	ISR1Gx	Generic Elective I	3-1-0	GE1
5.	ISR1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	ISR1W1	Seminar/ Workshop-I	0-2-0	
8.	ISR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I			L-T-P	
1.	ISR1G1	Advanced Data Base Management Systems	3-1-0	
2.	ISR1G2	Complexity of Security Algorithms	3-1-0	
3.	ISR1G3	Agent Technology	3-1-0	
List of Elective I			L-T-P	
1.	ISR1E1	Data Security	3-1-1	
2.	ISR1E2	Information Theory and Coding	3-1-1	
3.	ISR1E3	Data Compression and Stagnography	3-1-1	
SEM II			L-T-P	
1.	ISR2C1	Information Security Management	3-1-1	PC4
2.	ISR2C2	Digital Forensics and Security Audit	3-1-1	PC5
3.	ISR2C3	Secure Wireless Networks	3-1-1	PC6
4.	ISR2Gx	Generic Elective II	3-1-0	GE2
5.	ISR2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	ISR2W2	Seminar/ Workshop-II	0-2-0	
8.	ISR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II			L-T-P	
1.	ISR2G1	Cloud Computing	3-1-0	GE2
2.	ISR2G2	Applied Cryptography	3-1-0	GE2
3.	ISR2G3	Cyber Crime and Information Warfare	3-1-0	GE2
List of Elective II			L-T-P	
1.	ISR2E1	Biometric Systems & Security	3-1-1	PE2
2.	ISR2E2	Secure Software Engineering	3-1-1	PE2
3.	ISR2E3	Trust management in E- Commerce	3-1-1	PE2
SEM III				
	ISR3D1	Dissertation Phase I	0-0-12	
	ISR3V3	Comprehensive Viva III	0-0-4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV				
	ISR3D2	Dissertation Phase II	0-0-12	
	ISR4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits	

M.E Programmes

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

PROGRAMME SPECIFIC OUTCOMES (PSO)

M.E in Information Technology (with specialization in Information Security)

PSO1: Students will demonstrate sound knowledge and ability to identify and solve problems in the area of Information Security to become successful professionals.

PSO2: Students will demonstrate research skill by working on problems that involve study of literature, methodologies, techniques, and tools, and conduct of experiments needing data interpretation.

PSO3: Students will demonstrate an ability to critically examine software systems with focus on security related problems and to come up with solutions that may require collaborative, multidisciplinary and innovative approach.

PSO4: Students will demonstrate an ability to use modern threat management systems and software tools, to analyse and solve security related problems.

PSO5: Students will exhibit an understanding of professional, ethical and social responsibilities.

PSO6: Students will be able to communicate orally and in writing in an effective way, and to present their work before engineering community.

PSO7: Students will demonstrate management skills in handling security based projects involving time and financial planning and understanding entrepreneurship.

**M. E. Electronics (Specialization in Digital
Instrumentation) (FULL TIME)**

List of PO_PSO

S. No.	Category	No. of Credits			
		SEM I	SEM II	SEM III	SEM IV
1.	Course Compulsory	15	15	-	-
2.	Generic Elective	4	4	-	-
3.	Programme Elective	5	5	-	-
4.	Skill development	2	2	-	-
5.	Seminar/ Workshop	2	2	-	-
6.	Dissertation Phase	-	-	12	12
Actual Credits per Semester		28	28	12	12
Total actual Programme Credits					80
7.	Virtual Credit Comprehensive Viva	4	4	4	4
Total Credits per Semester		32	32	16	16
Total (Actual + Virtual) Credits					96

**M.E Electronics (Specialization in Digital Instrumentation)
(Full Time) List of PO_PSO**

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-I	Sub Type
1.	DIR1C1	Industrial Transducers & Smart Sensors	3-1-1	PC1
2.	DIR1C2	Embedded System using ARM Micro controller	3-1-1	PC2
3.	DIR1C3	Modern Control Systems	3-1-1	PC3
4.	DIR1GX	Generic Elective I	3-1-0	GE1
5.	DIR1EX	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	DIR1W1	Seminar / Workshop / Research Tool	0-2-0	
8.	DIR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I				
1.	DIR1G1	Advance System Design	3-1-0	GE1
2.	DIR1G2	Wireless Sensor Network	3-1-0	GE1
3.	DIR1G3	Advanced Communication Networks	3-1-0	GE1
4.	DIR1G4	Medical Instrumentation	3-1-0	GE1
List of Elective I				
1.	DIR1E1	Fuzzy Logic & Neural Network	3-1-1	PE1
2.	DIR1E2	Object Oriented Programming	3-1-1	PE1
3.	DIR1E3	Nano Devices and Nano sensors	3-1-1	PE1
4.	DIR1E4	Advance Digital Signal Processing	3-1-1	PE1
SEM II				
1.	DIR2C1	Digital Image Processing	3-1-1	PC4
2.	DIR2C2	Process Instrumentation & Industrial Control	3-1-1	PC5
3.	DIR2C3	System Design Using Verilog	3-1-1	PC6
4.	DIR2GX	Generic Elective II	3-1-0	GE2
5.	DIR2EX	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	DIR2W2	Seminar / Workshop / Research Tools	0-2-0	
8.	DIR2V2	Comprehensive Viva I	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II				
1.	DIR2G1	Software Engineering	3-1-0	GE2
2.	DIR2G2	Embedded RTOS	3-1-0	GE2
3.	DIR2G3	Modeling and Simulation	3-1-0	GE2
4.	DIR2G4	Industrial Communication	3-1-0	GE2
List of Elective II				
1.	DIR2E1	Analog and Digital VLSI Circuit Design	3-1-1	PE2
2.	DIR2E2	Analytical Instrumentation	3-1-1	PE2
3.	DIR2E3	Optical and Laser Instrumentation	3-1-1	PE2
4.	DIR2E4	Advanced Industrial Drives and Control	3-1-1	PE2
SEM III	DIR3D1	Dissertation Phase I	0-0-12	
	DIR3V3	Comprehensive Viva III	0-0-4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV	DIR4D2	Dissertation Phase II	0-0-12	
	DIR4V4	Comprehensive Viva IV	0-0-4	

Total Credit for SEM IV	12 actual + 4 Virtual credits
Total Credit	80 actual + 16 Virtual credits

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

Programme Specific Outcomes:

7. Master of Engineering (M.E) in Digital Instrumentation.

PSO1: Ability to perform instrumentation and data acquisition in various process industries for better product development and improved quality.

PSO2: Ability to apply the concept for accurate and precise measurement of parameters for investigation and analysis in medical domain.

PSO3: Ability to establish sensor networking system to exchange the information, signal processing and data base management for the development of IOT and futuristic applications.

PSO4: Ability to understand the concepts and applications in the field of embedded systems and VLSI technology in analysis, design, and development of various types of electronic systems.

PSO5: Ability to use ICT and EDA tools (both software and hardware) for the design and analysis of complex electronic systems for providing solution to real world problem and doing research activities.

PSO6: Developing excellent skills to communicate in both oral and written forms, having good interpersonal and analytical skills as a leader in a team, following good professional ethics with appreciation of societal responsibilities.

M. E. Electronics (Spl in Digital Communication) (FULL TIME)
LIST OF PO_PSO_CO
Batch 2015– 2016 and onwards

S. No.	Category	No. of Credits			
		SEM I	SEM II	SEM III	SEM IV
1.	Course Compulsory	15	15	-	-
2.	Generic Elective	4	4	-	-
3.	Programme Elective	5	5	-	-
4.	Skill development	2	2	-	-
5.	Seminar/ Workshop	2	2	-	-
6.	Dissertation Phase	-	-	12	12
Actual Credits per Semester		28	28	12	12
Total actual Programme Credits					80
7.	Virtual Credited Comprehensive Viva	4	4	4	4
Total Credits per Semester		32	32	16	16
Total Programme Credits					96

M. E. Electronics (Spl in Digital Communication) (FULL TIME)
LIST OF PO_PSO_CO
Batch 2015- 2016 and onwards

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	Sub Type
1.	DCR1C1	Modern Communication System	3-1-1	PC1
2.	DCR1C2	Embedded System using ARM Microcontroller	3-1-1	PC2
3.	DCR1C3	Advance Computer Networking	3-1-1	PC3
4.	DCR1Gx	Generic Elective I	3-1-0	GE1
5.	DCR1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	DCR1W1	Seminar/ Workshop/Research Tool	0-2-0	
8.	DCR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I			L-T-P	
1.	DCR1G1	Advance System Design	3-1-0	GE1
2.	DCR1G2	Wireless Sensor Network	3-1-0	GE1
3.	DCR1G3	Advance Digital Signal Processing	3-1-0	GE1
4.	DCR1G4	Information Theory and Coding	3-1-0	GE1
List of Elective I			L-T-P	
1.	DCR1E1	Satellite Communication	3-1-1	PE1
2.	DCR1E2	Object Oriented Programming	3-1-1	PE1
3.	DCR1E3	Embedded RTOS	3-1-1	PE1
4.	DCR1E4	Software Engineering	3-1-1	PE1
SEM II				
1.	DCR2C1	Modelling and Simulation	3-1-1	PC4
2.	DCR2C2	Mobile Communication Networks	3-1-1	PC5
3.	DCR2C3	System Design Using Verilog	3-1-1	PC6
4.	DCR2Gx	Generic Elective II	3-1-0	GE2
5.	DCR2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	DCR2W2	Seminar/ Workshop/ Research Tool	0-2-0	
8.	DCR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II			L-T-P	
1.	DCR2G1	Broadband Access Technology	3-1-0	GE2
2.	DCR2G2	Nanodevices & Nanosensors	3-1-0	GE2
3.	DCR2G3	Advance Antenna System	3-1-0	GE2
4.	DCR2G4	Industrial Communication	3-1-0	GE2
List of Elective II			L-T-P	
1.	DCR2E1	Analog and Digital CMOS Circuit Design	3-1-1	PE2
2.	DCR2E2	Network Security	3-1-1	PE2
3.	DCR2E3	Mobile Computing	3-1-1	PE2
4.	DCR2E4	Software testing and Quality assurance	3-1-1	PE2

M. E. Electronics (Spl in Digital Communication) (FULL TIME)

**LIST OF PO_PSO_CO
Batch 2015– 2016 and onwards**

SEM III			L-T-P	
1	DCR3D1	Dissertation Phase I	0-0-12	
2	DCR3V3	Comprehensive Viva III	0-0-4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV			L-T-P	
1	DCR4D2	Dissertation Phase II	0-0-12	
2	DCR4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits=96	

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

Programme Specific Outcomes

Master of Engineering (M.E) in Electronics and Telecommunication Engineering with spl in DIGITAL COMMUNICATION

PSO1: The ability to understand the concepts and applications in the field of Telecommunication/Networking, signal processing, embedded systems and VLSI technology in analysis, design, and development of various types of electronic systems.

PSO2: Ability to in using ICT and EDA tools (both software and hardware) for the design and analysis of complex electronic systems for providing solution to real world problem and doing research activities.

PSO3: The skills to communicate in both oral and written forms, good interpersonal and analytical skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

Mechanical Engineering (Industrial Engineering & Management)
(Full Time)
Proposed Scheme for CBCS

SEM I				
S.N O	Sub Code	Sub Name	Number of Credit	Sub Type
1.	IMR1C1	Productivity & Technology Management	3-1-1	PC1
2.	IMR1C2	Quantitative Techniques for Management	3-1-1	PC2
3.	IMR1C3	Production & Operations Management	3-1-1	PC3
4.	IMR1Gx	Generic Elective I	3-1-0	GE1
5.	IMR1Ex	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	IMR1W1	Seminar/ Res. Tool/Work Shop-1	0-2-0	
8.	IMR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
		List of Generic Elective I		
1.	IMR1G1	Principles & Practices of Management	3-1-0	GE1
2.	IMR1G2	Human Resource management	3-1-0	GE1
3.	IMR1G3	e –Business & Commerce	3-1-0	GE1
		List of Elective I		
	IMR1E1	Statistical Quality Control and Total Quality Management		
2.	IMR1E2	Strategic Management	3-1-1	PE1
3.	IMR1E3	Business Process Reengineering	3-1-1	PE1
SEM II				
1.	IMR2C1	Financial Management	3-1-1	PC4
2.	IMR2C2	Materials Management	3-1-1	PC5
3.	IMR2C3	Supply Chain Management	3-1-1	PC6
4.	IMR2Gx	Generic Elective II	3-1-0	GE2
5.	IMR2Ex	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	IMR2W2	Seminar/ Res. Tool/Work Shop-2	0-2-0	
8.	IMR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
		List of Generic Elective II		
1.	IMR2G1	Project Management	3-1-0	GE2
2.	IMR2G2	Enterprise Resource Planning	3-1-0	GE2
		List of Elective II		
1.	IMR2E1	Marketing Management	3-1-1	PE2
2.	IMR2E2	Product Design and Manufacturing	3-1-1	PE2
3.	IMR2E3	Customer Relationship Management	3-1-1	PE2
4.	IMR2E4	Industrial Marketing	3-1-1	PE2
SEM III	IMR3D1	Dissertation Phase I	0-0-12=12	

	IMR3V3	Comprehensive Viva III	0-0-4=4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV	IMR4D2	Dissertation Phase II	0-0-12=12	
	IMR4V4	Comprehensive Viva IV	0-0-4=4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	
Total Credits			80 actual + 16 Virtual credits	

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

Program Specific Outcomes (PSOs) of M.E. (Industrial Engineering Management)

The Post Graduates of the Industrial Engineering Management will attain:

PSO1: Excellence in application of industrial concepts like Quality Management, Analysis of plant Layouts, Management of Operations in industries, Material Handling, Product Design & Development. Students will achieve capability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

PSO2: Excellence in logistics, supply chain concept, the students will also be able to understand the principles of management, marketing functions, they will also be able to make financial decisions in different dynamic financial situations.

PSO3: Excellence in Optimization of practical business problems with the help of quantitative techniques. They will be able to manage different real time projects. They will also be able to analyze, interpret and provide solutions to the real life Industrial Engineering problems.

M.E Mechanical Engineering (Design & Thermal) (Full Time)
LIST OF PO_PSO for CBCS

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit	Sub Type
1.	DTR1C1	Tribology	3-1-1	PC1
2.	DTR1C2	Design of Internal Combustion Engine Systems	3-1-1	PC2
3.	DTR1C3	Advanced Machine Design	3-1-1	PC3
4.	DTR1GX	Generic Elective I	3-1-0	GE1
5.	DTR1EX	Elective I	3-1-1	PE1
6.	ASR1S1	Soft Skills -1	2-0-0	
7.	DTR1W1	Seminar/ Res. Tool/Work Shop-1	0-2-0	
8.	DTR1V1	Comprehensive Viva I	0-0-4	
Total Credit for SEM I			28 actual + 4 Virtual credits	
List of Generic Elective I				
1.	DTR1G1	Advanced Thermodynamics	3-1-0	GE1
2.	DTR1G2	Non Conventional Energy Systems	3-1-0	GE1
3.	DTR1G3	Management Information System	3-1-0	GE1
4.	DTR1G4	Finite Element Analysis	3-1-0	GE1
List of Elective I				
1.	DTR1E1	Advanced Mechanics of Solids	3-1-1	PE1
2.	DTR1E2	Fatigue Creep and Fracture	3-1-1	PE1
3.	DTR1E3	Mechanism and Robot Kinematics	3-1-1	PE1
4.	DTR1E4	Thermal Systems : Simulation and Design	3-1-1	PE1
SEM II				
1.	DTR2C1	Machinery Fault Diagnosis and Signal Processing	3-1-1	PC4
2.	DTR2C2	Advanced Refrigeration and Air Conditioning	3-1-1	PC5
3.	DTR2C3	Computer Aided Modeling and Simulation	3-1-1	PC6
4.	DTR2GX	Generic Elective II	3-1-0	GE2
5.	DTR2EX	Elective II	3-1-1	PE2
6.	ASR2S2	Soft Skills -2	2-0-0	
7.	DTR2W2	Seminar/ Res. Tool/Work Shop-2	0-2-0	
8.	DTR2V2	Comprehensive Viva II	0-0-4	
Total Credit for SEM II			28 actual + 4 Virtual credits	
List of Generic Elective II				
1.	DTR2G1	Advanced Heat Transfer	3-1-0	GE2
2.	DTR2G2	Rapid Prototyping	3-1-0	GE2
3.	DTR2G3	Cogeneration and Waste Heat Recovery	3-1-0	GE2
4.	DTR2G4	Mechatronics in Manufacturing Systems	3-1-0	GE2
List of Elective II				
1.	DTR2E1	Machine Vibrations Analysis	3-1-1	PE2
2.	DTR2E2	Experimental Stress Analysis	3-1-1	PE2
3.	DTR2E3	Applied Elasticity and Plasticity	3-1-1	PE2
4.	DTR2E4	Automotive Systems: Analysis and Design	3-1-1	PE2
SEM III				
	DTR3D1	Dissertation Phase I	0-0-12=12	
	DTR3V3	Comprehensive Viva III	0-0-4=4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV				
	DTR4D2	Dissertation Phase II	0-0-12=12	
	DTR4V4	Comprehensive Viva IV	0-0-4=4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	

M.E Programmes

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

Program Specific Outcomes (PSOs) of M.E. (Design & Thermal)

The students having Post Graduation in the discipline of Design & Thermal will attain:

PSO1: Excellence in application of the concepts of tribology and machine design on the various operations in industries. Students will achieve capability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

PSO2: Excellence in applying principles for thermodynamic analyses of various thermodynamic air standard cycles/heat engines under maximum power output conditions. Moreover students will be able to evaluate the efficiency of the cycle under maximum power output conditions.

PSO3: Excellence in Optimization of various thermodynamic processes with the help of quantitative techniques. They will also be able to analyze, interpret and provide solutions to the actual thermodynamic cycles/processes.

M. E. Computer Engineering (PART TIME) With Specialization in Software Engineering

**LIST OF PO_PSO_CO
Batch 2015– 2016 and Onwards**

S. No.	Category	No. of Credits					
		SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI
1.	Course Compulsory	10	5	10	5		
2.	Generic Elective	4	-	4	-		
3.	Programme Elective	-	5	-	5		
4.	Skill development	-	2	-	2		
5.	Seminar/ Workshop/ Research Tool	-	2	-	2		
6.	Dissertation Phase		-		-	12	12
Actual Credits per semester		14	14	14	14	12	12
Total actual Programme Credits per semester							80
7.	Virtual Credited Comprehensive Viva	2	2	2	2	4	4
Total Credits per semester		16	16	16	16	16	16
Total Programme Credits per semester							96

M. E. Computer Engineering (PART TIME) With Specialization in Software Engineering
LIST OF PO_PSO_CO
Batch 2015- 2016 and Onwards

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	SEP1C1	Advanced Algorithms	3-1-1	PC1
2.	SEP1C2	Object Oriented Analysis & Design	3-1-1	PC2
3.	SEP1Gx	Generic Elective I	3-1-0	GE1
4.	SEP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II			L-T-P	
1.	SEP2C3	Software Construction	3-1-1	PC3
2.	SEP2Ex	Elective I	3-1-1	PE1
3.	SEP2W1	Seminar/ Workshop/Research Tool	0-2-0	
4.	ASP2S1	Soft Skills -1	2-0-0	
5.	SEP2V2	Comprehensive Viva II	0-0-2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
		List of Generic Elective I	L-T-P	
1.	SEP1G1	Soft Computing	3-1-0	GE1
2.	SEP1G2	Distributed Operating System	3-1-0	GE1
3.	SEP1G3	Advance Computer Architecture	3-1-0	GE1
		List of Elective I	L-T-P	
1.	SEP2E1	Database Engineering	3-1-1	PE1
2.	SEP2E2	Big Data Analytics	3-1-1	PE1
3.	SEP2E3	Secure Software Engineering	3-1-1	PE1
SEM III			L-T-P	
1.	SEP3C4	Software Project Planning and Management	3-1-1	PC4
2.	SEP3C5	Design Pattern	3-1-1	PC5
3.	SEP3Gx	Generic Elective II	3-1-0	GE2
4.	SEP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV			L-T-P	
1.	SEP4C6	Software Testing and Quality Assurance	3-1-1	PC6
2.	SEP4Ex	Elective II	3-1-1	PE2
3.	SEP4W2	Seminar/ Res. Tool/Research Tool	0-2-0	
4.	ASP4S2	Soft Skills -2	2-0-0	
5.	SEP4V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	

M. E. Computer Engineering (PART TIME) With Specialization in Software Engineering

LIST OF PO_PSO_CO Batch 2015– 2016 and Onwards

		List of Generic Elective II	L-T-P	
1.	SEP3G4	Data Mining & Warehousing	3-1-0	GE2
2.	SEP3G5	Cloud Computing	3-1-0	GE2
3.	SEP3G6	Simulation and Modelling	3-1-0	GE2
		List of Elective II	L-T-P	
1.	SEP4E4	Speech And Language Processing	3-1-1	PE2
2.	SEP4E5	Aspect Oriented Software Engineering	3-1-1	PE2
3.	SEP4E6	Machine Learning	3-1-1	PE2

SEM V L-T-P				
1.	SEP5D1	Dissertation Phase I	0-0-12	
2.	SEP5V5	Comprehensive Viva V	0-0-4	
Total Credit for SEM V			12 actual + 4 Virtual credits	
SEM VI			L-T-P	
1.	SEP6D2	Dissertation Phase II	0-0-12	
2.	SEP6V6	Comprehensive Viva IV	0-0-4	
Total Credit for SEM VI			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits	

M.E Programmes

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

PROGRAMME SPECIFIC OUTCOMES

ME Computer Engineering (Specialization in Software Engineering)

It is expected that, upon completion of the ME specialization in Software Engineering students will have the following capabilities:

Students can effectively apply software engineering practice over the entire system lifecycle. This includes requirements engineering, analysis, prototyping, design, implementation, testing, maintenance activities and management of risks involved in software systems.

Students know classical and evolving software engineering methods, can select and tailor appropriate methods for projects, and can apply them as both team members and managers to achieve project goals.

Students can apply basic software quality assurance practices to ensure that software designs, development, and maintenance meet or exceed applicable standards.

Students have effective written and oral communication skills. Students can prepare and publish the necessary documents required throughout the project lifecycle. Students can effectively contribute to project discussions and presentations.

Students will have theoretical foundations that will help them to analyzing and modelling software requirements.

(Information Technology) with Specialization in Information Security List of PO_PSO (Part Time)

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	ISP1C1	Advanced Algorithms	3-1-1	PC1
2.	ISP1C2	Secure Computing Techniques	3-1-1	PC2
3.	ISP1Gx	Generic Elective I	3-1-0	GE1
4.	ISP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
			L-T-P	
1.	ISP2C3	Advanced Computer Networks	3-1-1	PC3
2.	ISP2EX	Elective I	3-1-1	PE1
3.	ISP2W1	Seminar/ Workshop-I	0-2-0	
4.	ISP2V2	Comprehensive Viva II	0-0-2	
5.	ASP2S1	Soft Skills-1	2-0-0	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I			L-T-P	
1.	ISP1G1	Advanced Data Base Management Systems	3-1-0	GE1
2.	ISP1G2	Complexity of Security Algorithms	3-1-0	GE1
3.	ISP1G3	Agent Technology	3-1-0	GE1
List of Elective I			L-T-P	
1.	ISP2E1	Data Security	3-1-1	PE1
2.	ISP2E2	Information Theory and Coding	3-1-1	PE1
3.	ISP2E3	Data Compression and Stagnography	3-1-1	PE1
SEM III				
			L-T-P	
1.	ISP3C1	Information Security Management	3-1-1	PC4
2.	ISP3C2	Digital Forensics and Security Audit	3-1-1	PC5
3.	ISP3Gx	Generic Elective II	3-1-0	GE2
4.	ISP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV				
			L-T-P	
1.	ISP4C3	Secure Wireless Networks	3-1-1	PC6
2.	ISP4Ex	Elective II	3-1-1	PE2
3.	ISP4W2	Seminar/ Workshop-II	0-2-0	
4.	ISP4V4	Comprehensive Viva IV	0-0-2	
5.	ASP4S2	Soft Skills-2	2-0-0	
Total Credit for SEM IV			14 actual + 2 Virtual credits	
List of Generic Elective II			L-T-P	
1.	ISP3G1	Cloud Computing	3-1-0	GE2
2.	ISP3G2	Applied Cryptography	3-1-0	GE2
3.	ISP3G3	Cyber Crime and Information Warfare	3-1-0	GE2
List of Elective II			L-T-P	
1.	ISP4E1	Biometric Systems & Security	3-1-1	PE2

2.	ISP4E2	Secure Software Engineering	3-1-1	PE2
3.	ISP4E3	Trust management in E- Commerce	3-1-1	PE2
SEM V				
ISP5D1	Dissertation Phase I		0-0-12=12	
ISP5V5	Comprehensive Viva V		0-0-4=4	
Total Credit for SEM V			12 actual + 4 Virtual credits	
SEM VI				
ISP6D2	Dissertation Phase II		0-0-12=12	
ISP6V6	Comprehensive Viva VI		0-0-4=4	
Total Credit for SEM VI			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits	

S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	ISP1C1	Advanced Algorithms	3-1-1	PC1
2.	ISP1C2	Secure Computing Techniques	3-1-1	PC2
3.	ISP1Gx	Generic Elective I	3-1-0	GE1
4.	ISP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II			L-T-P	
1.	ISP2C3	Advanced Computer Networks	3-1-1	PC3
2.	ISP2EX	Elective I	3-1-1	PE1
3.	ISP2W1	Seminar/ Workshop-I	0-2-0	
4.	ISP2V2	Comprehensive Viva II	0-0-2	
5.	ASP2S1	Soft Skills-1	2-0-0	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I			L-T-P	
1.	ISP1G1	Advanced Data Base Management Systems	3-1-0	GE1
2.	ISP1G2	Complexity of Security Algorithms	3-1-0	GE1
3.	ISP1G3	Agent Technology	3-1-0	GE1
List of Elective I			L-T-P	
1.	ISP2E1	Data Security	3-1-1	PE1
2.	ISP2E2	Information Theory and Coding	3-1-1	PE1
3.	ISP2E3	Data Compression and Stagnography	3-1-1	PE1
SEM III			L-T-P	
1.	ISP3C1	Information Security Management	3-1-1	PC4
2.	ISP3C2	Digital Forensics and Security Audit	3-1-1	PC5
3.	ISP3Gx	Generic Elective II	3-1-0	GE2
4.	ISP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV			L-T-P	
1.	ISP4C3	Secure Wireless Networks	3-1-1	PC6
2.	ISP4Ex	Elective II	3-1-1	PE2
3.	ISP4W2	Seminar/ Workshop-II	0-2-0	
4.	ISP4V4	Comprehensive Viva IV	0-0-2	
5.	ASP4S2	Soft Skills-2	2-0-0	
Total Credit for SEM IV			14 actual + 2 Virtual credits	
List of Generic Elective II			L-T-P	
1.	ISP3G1	Cloud Computing	3-1-0	GE2
2.	ISP3G2	Applied Cryptography	3-1-0	GE2
3.	ISP3G3	Cyber Crime and Information Warfare	3-1-0	GE2
List of Elective II			L-T-P	
1.	ISP4E1	Biometric Systems & Security	3-1-1	PE2
2.	ISP4E2	Secure Software Engineering	3-1-1	PE2
3.	ISP4E3	Trust management in E- Commerce	3-1-1	PE2
SEM V				
ISP5D1		Dissertation Phase I	0-0-12=12	
ISP5V5		Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V			12 actual + 4 Virtual credits	
SEM VI				

ISP6D2	Dissertation Phase II	0-0-12=12	
ISP6V6	Comprehensive Viva VI	0-0-4=4	
Total Credit for SEM VI		12 actual + 4 Virtual	credits
Total Credit		80 actual + 16 Virtual	credits

M.E Programmes

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems including designing, conducting experiments, interpreting data and providing well informed conclusions.

PO5: An ability to contribute by research and innovation to solve engineering problems

PO6: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO7: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO8: Committed to professional ethics and responsibilities and norms of engineering practice.

PO9: Understand the impact of engineering solutions in a societal context and need for sustainable development.

PO10: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PROGRAMME SPECIFIC OUTCOMES (PSO)

M.E in Information Technology (with specialization in Information Security)

PSO1: Students will demonstrate sound knowledge and ability to identify and solve problems in the area of Information Security to become successful professionals.

PSO2: Students will demonstrate research skill by working on problems that involve study of literature, methodologies, techniques, and tools, and conduct of experiments needing data interpretation.

PSO3: Students will demonstrate an ability to critically examine software systems with focus on security related problems and to come up with solutions that may require collaborative, multidisciplinary and innovative approach.

PSO4: Students will demonstrate an ability to use modern threat management systems and software tools, to analyse and solve security related problems.

Electronics (Specialization in Digital Instrumentation) (PART TIME)

List of PO PSO_CO
Batch 2015– 2016 and onwards

S. No.	Category	No. of Credits					
		SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI
1.	Course Compulsory	10	5	10	5		
2.	Generic Elective	4	-	4	-		
3.	Programme Elective	-	5	-	5		
4.	Skill development	-	2	-	2		
5.	Seminar/ Workshop	-	2	-	2		
6.	Dissertation Phase		-		-	12	12
Actual Credits per semester		14	14	14	14	12	12
Total actual Programme Credits per semester							80
7.	Virtual Credited Comprehensive Viva	2	2	2	2	4	4
Total Credits per semester		16	16	16	16	16	16
Total Programme Credits per semester							96

**M.E Electronics (Specialization Digital Instrumentation)
(Part Time)**

List of PO_PSO

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-I	SubType
1.	DIP1C1	Industrial Transducer & Smart Sensors	3-1-1	PC1
2.	DIP1C2	Embedded System using ARM Microcontroller	3-1-1	PC2
3.	DIP1GX	Generic Elective I	3-1-0	GE1
4.	DIP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
1.	DIP2C3	Modern Control System	3-1-1	PC3
2.	DIP2EX	Elective I	3-1-1	PE1
3.	ASP2S1	Soft Skill 1	2-0-0	
4.	DIP2W1	Seminar / Workshop / Research Tool	0-2-0	
5.	DIP2V2	Comprehensive Viva II	0-0-2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I				
1.	DIP1G1	Advance System Design	3-1-0	GE1
2.	DIP1G2	Wireless Sensor Network	3-1-0	GE1
3.	DIP1G3	Advanced Communication Networks	3-1-0	GE1
4.	DIP1G4	Medical Instrumentation	3-1-0	GE1
List of Elective I				
1.	DIP2E1	Fuzzy Logic & Neural Network	3-1-1	PE1
2.	DIP2E2	Object Oriented Programming	3-1-1	PE1
3.	DIP2E3	Nano Devices and Nano sensors	3-1-1	PE1
4.	DIP2E4	Advance Digital Signal Processing	3-1-1	PE1
SEM III				
1.	DIP3C1	Digital Image Processing	3-1-1	PC4
2.	DIP3C2	Process Instrumentation & Industrial Control	3-1-1	PC5
3.	DIP3GX	Generic Elective II	3-1-0	GE2
4.	DIP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV				
1.	DIP4C3	System Design Using Verilog	3-1-1	PC6
2.	DIP4EX	Elective II	3-1-1	PE2
3.	ASP4S2	Soft Skill 2	2-0-0	
4.	DIP4W2	Seminar / Workshop / Research Tool	0-2-0	
5.	DIP4V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	
List of Generic Elective II				
1.	DIP3G1	Software Engineering	3-1-0	GE2
2.	DIP3G2	Embedded RTOS	3-1-0	GE2
3.	DIP3G3	Modeling and Simulation	3-1-0	GE2
4.	DIP3G4	Industrial Communication	3-1-0	GE2
List of Elective II				
1.	DIP4E1	Analog and Digital VLSI Circuit Design	3-1-1	PE2
2.	DIP4E2	Analytical Instrumentation	3-1-1	PE2
3.	DIP4E3	Optical and Laser Instrumentation	3-1-1	PE2
4.	DIP4E4	Advanced Industrial Drives and Control	3-1-1	PE2
SEMV	DIP5D1	Dissertation Phase I	0-0-12	
	DIP5V5	Comprehensive Viva V	0-0-4	
Total Credit for SEM V			12 actual + 4 Virtual credit	

SEMVI	DIP6D2	Dissertation Phase II	0-0-12	
	DIP6V6	Comprehensive Viva VI	0-0-4	
Total Credit for SEM VI			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16Virtual credits	

Program outcomes

Program outcomes (POs) designed for engineering postgraduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes M.E Programme at IET-DAVV can be illustrated as:

9. Master of Engineering (M.E) in Digital Instrumentation.(Part Time)

PSO1: Ability to perform instrumentation and data acquisition in various process industries for better product development and improved quality.

PSO2: Ability to apply the concept for accurate and precise measurement of parameters for investigation and analysis in medical domain.

PSO3: Ability to establish sensor networking system to exchange the information, signal processing and data base management for the development of IOT and futuristic applications.

PSO4: Ability to understand the concepts and applications in the field of embedded systems and VLSI technology in analysis, design, and development of various types of electronic systems.

PSO5: Ability to use ICT and EDA tools (both software and hardware) for the design and analysis of complex electronic systems for providing solution to real world problem and doing research activities.

PSO6: Developing excellent skills to communicate in both oral and written forms, having good interpersonal and analytical skills as a leader in a team, following good professional ethics with appreciation of societal responsibilities.

M. E. Electronics (Spl in Digital Communication) (PART TIME)
LIST OF PO_PSO_CO
Batch 2015- 2016 and onwards

S. No.	Category	No. of Credits					
		SEM I	SEM II	SEM III	SEM IV	SEM V	SEM VI
1.	Course Compulsory	10	5	10	5		
2.	Generic Elective	4	-	4	-		
3.	Programme Elective	-	5	-	5		
4.	Skill development	-	2	-	2		
5.	Seminar/ Workshop	-	2	-	2		
6.	Dissertation Phase		-		-	12	12
Actual Credits per semester		14	14	14	14	12	12
Total actual Programme Credits per semester							80
7.	Virtual Credited Comprehensive Viva	2	2	2	2	4	4
Total Credits per semester		16	16	16	16	16	16
Total Programme Credits per semester							96

M. E. Electronics (Spl in Digital Communication) (PART TIME)
LIST OF PO_PSO_CO
Batch 2015– 2016 and onwards

SEM I				
S.NO	Sub Code	Sub Name	Number of Credit L-T-P	SubType
1.	DCP1C1	Modern Communication System	3-1-1	PC1
2.	DCP1C2	Embedded System using ARM Microcontroller	3-1-1	PC2
3.	DCP1Gx	Generic Elective I	3-1-0	GE1
4.	DCP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II			L-T-P	
1.	DCP2C3	Advance Computer Networking	3-1-1	PC3
2.	DCP2Ex	Elective I	3-1-1	PE1
3.	DCP2W1	Seminar/ Workshop/Research Tool	0-2-0	
4.	ASP2S1	Soft Skills -1	2-0-0	
5.	DCP2V2	Comprehensive Viva II	0-0-2	
Total Credit for SEM II			14 actual + 2 Virtual credits	
List of Generic Elective I			L-T-P	
1.	DCP1G1	Advance System Design	3-1-0	
2.	DCP1G2	Wireless Sensor Network	3-1-0	
3.	DCP1G3	Advance Digital Signal Processing	3-1-0	
4.	DCP1G4	Information Theory and Coding	3-1-0	
List of Elective I			L-T-P	
1.	DCP2E1	Satellite Communication	3-1-1	
2.	DCP2E2	Object Oriented Programming	3-1-1	
3.	DCP2E3	Embedded RTOS	3-1-1	
4.	DCP2E4	Software Engineering	3-1-1	
SEM III			L-T-P	
1.	DCP3C1	Modelling and Simulation	3-1-1	PC4
2.	DCP3C2	Mobile Communication Networks	3-1-1	PC5
3.	DCP3Gx	Generic Elective II	3-1-0	GE2
4.	DCP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV			L-T-P	
1.	DCP4C3	System Design Using Verilog	3-1-1	PC6
2.	DCP4Ex	Elective II	3-1-1	PE2
3.	DCP4W2	Seminar/ Res. Tool/Research Tool	0-2-0	
4.	ASP4S2	Soft Skills -2	2-0-0	
5.	DCP3V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	

M. E. Electronics (Spl in Digital Communication) (PART TIME)
LISTT OF PO_PSO_CO
Batch 2015– 2016 and onwards

		List of Generic Elective II	L-T-P	
1.	DCP3G1	Broadband Access Technology	3-1-0	
2.	DCP3G2	Nano devices & Nano Sensors	3-1-0	
3.	DCP3G3	Advance Antenna System	3-1-0	
4.	DCP3G4	Industrial Communication	3-1-0	
		List of Elective II	L-T-P	
1.	DCP4E1	Analog and Digital CMOS Circuit Design	3-1-1	
2.	DCP4E2	Network Security	3-1-1	
3.	DCP4E3	Mobile Computing	3-1-1	
4.	DCP4E4	Software testing and Quality assurance	3-1-1	
SEM V			L-T-P	
1.	DCP5D1	Dissertation Phase I	0-0-12	
2.	DCP5V5	Comprehensive Viva V	0-0-4	
Total Credit for SEM V			12 actual + 4 Virtual credits	
SEM VI			L-T-P	
1.	DCP6D2	Dissertation Phase II	0-0-12	
2.	DCP6V6	Comprehensive Viva IV	0-0-4	
Total Credit for SEM VI			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits	

M. E. Electronics (Spl in Digital Communication) (PART TIME)
LIST OF PO_PSO
Batch 2015– 2016 and onwards

SEM III			L-T-P	
1	DCR3D1	Dissertation Phase I	0-0-12	
2	DCR3V3	Comprehensive Viva III	0-0-4	
Total Credit for SEM III			12 actual + 4 Virtual credits	
SEM IV			L-T-P	
1	DCR4D2	Dissertation Phase II	0-0-12	
2	DCR4V4	Comprehensive Viva IV	0-0-4	
Total Credit for SEM IV			12 actual + 4 Virtual credits	
Total Credit			80 actual + 16 Virtual credits=96	

Program outcomes

Program outcomes (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes

Master of Engineering (M.E) in Electronics and Telecommunication Engineering with spl in DIGITAL COMMUNICATION

PSO1: The ability to understand the concepts and applications in the field of Telecommunication/Networking, signal processing, embedded systems and VLSI technology in analysis, design, and development of various types of electronic systems.

PSO2: Ability to in using ICT and EDA tools (both software and hardware) for the design and analysis of complex electronic systems for providing solution to real world problem and doing research activities.

PSO3: The skills to communicate in both oral and written forms, good interpersonal and analytical skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

Mechanical Engineering (Industrial Engineering & Management)
(Part Time)
Proposed Scheme for CBCS

SEM I

S.NO	Sub Code	Sub Name	Number of Credit	Sub Type
1.	IMP1C1	Productivity & Technology Management	3-1-1	PC1
2.	IMP1C2	Quantitative Techniques for Management	3-1-1	PC2
3.	IMP1Gx	Generic Elective I	3-1-0	GE1
4.	IMP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
1.	IMP2C3	Production & Operations Management	3-1-1	PC3
2.	IMP2Ex	Elective I	3-1-1	PE1
3.	IMP2W1	Seminar/ Res. Tool/Work Shop-1	0-2-0	
4.	IMP2V2	Comprehensive Viva II	0-0-2	
5.	ASP2S1	Soft Skills -1	2-0-0	
Total Credit for SEM II			14 actual + 2 Virtual credits	
<i>List of Generic Elective I</i>				
1.	IMP1G1	Principles & Practices of Management	3-1-0	GE1
2.	IMP1G2	Human Resource management	3-1-0	GE1
3.	IMP1G3	e –Business & Commerce)	3-1-0	GE1
<i>List of Elective I</i>				
Statistical Quality Control and Total Quality				
1.	IMP2E1	Management	3-1-1	PE1
2.	IMP2E2	Strategic Management	3-1-1	PE1
3.	IMP2E3	Business Process Reengineering	3-1-1	PE1
SEM III				
1.	IMP3C1	Financial Management	3-1-1	PC4
2.	IMP3C2	Materials Management	3-1-1	PC5
3.	IMP3Gx	Generic Elective II	3-1-0	GE2
4.	IMP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV				
1.	IMP4C3	Supply Chain Management	3-1-1	PC6
2.	IMP4Ex	Elective II	3-1-1	PE2
3.	IMP4W2	Seminar/ Res. Tool/Work Shop-2	0-2-0	
4.	ASP4S2	Soft Skills -2	2-0-0	
5.	IMP4V4	Comprehensive Viva IV	0-0-2	
Total Credit for SEM IV			14 actual + 2 Virtual credits	
<i>List of Generic Elective II</i>				
1.	IMP3G1	Project Management	3-1-0	GE2
2.	IMP3G2	Enterprise Resource Planning	3-1-0	GE2
<i>List of Elective II</i>				
1.	IMP4E1	Marketing Management	3-1-1	PE2
2.	IMP4E2	Product Design And Manufacturing	3-1-1	PE2

3.	IMP4E3	Customer Relationship Management	3-1-1	PE2
4.	IMP4E4	Industrial Marketing	3-1-1	PE2
SEM V				
	IMP5D1	Dissertation Phase I	0-0-12	
	IMP5V5	Comprehensive Viva V	0-0-4	
Total Credit for SEM V			12 actual + 4 Virtual credits	
SEM VI				
	IMP6D2	Dissertation Phase II	0-0-12	
	IMP6V6	Comprehensive Viva VI	0-0-4	
Total Credit for SEM VI			12 actual + 4 Virtual credits	
Total Credits			80 actual + 16 Virtual credits	

Program outcomes

Program outcomes (POs) designed for Engineering PostGraduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs) of M.E. (Industrial Engineering Management)

The Post Graduates of the Industrial Engineering Management will attain:

PSO1: Excellence in application of industrial concepts like Quality Management, Analysis of plant Layouts, Management of Operations in industries, Material Handling, Product Design & Development. Students will achieve capability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

PSO2: Excellence in logistics, supply chain concept, the students will also be able to understand the principles of management, marketing functions, they will also be able to make financial decisions in different dynamic financial situations.

PSO3: Excellence in Optimization of practical business problems with the help of quantitative techniques. They will be able to manage different real time projects. They will also be able to analyze, interpret and provide solutions to the real life Industrial Engineering problems.

Mechanical Engineering (Design & Thermal) (Part Time)
List Of PO_PSO

SEM I				
<i>S.NO</i>	<i>Sub Code</i>	<i>Sub Name</i>	<i>Number of Credit</i>	<i>SubType</i>
1.	DTP1C1	Tribology	3-1-1	PC1
2.	DTP1C2	Design of Internal Combustion Engine Systems	3-1-1	PC2
3.	DTP1GX	Generic Elective I	3-1-0	GE1
4.	DTP1V1	Comprehensive Viva I	0-0-2	
Total Credit for SEM I			14 actual + 2 Virtual credits	
SEM II				
1.	DTP2C3	Advanced Machine Design	3-1-1	PC3
2.	DTP2EX	Elective I	3-1-1	PE1
3.	DTP2W1	Seminar/ Res. Tool/Work Shop-1	0-2-0	
4.	DTP2V2	Comprehensive Viva II	0-0-2	
5.	ASP2S1	Soft Skills -1	2-0-0	
Total Credit for SEM II			14 actual + 2 Virtual credits	
<i>List of Generic Elective I</i>				
1.	DTP1G1	Advanced Thermodynamics	3-1-0	GE1
2.	DTP1G2	Non Conventional Energy Systems	3-1-0	GE1
3.	DTP1G3	Management Information System	3-1-0	GE1
4.	DTP1G4	Finite Element Analysis	3-1-0	GE1
<i>List of Elective I</i>				
1.	DTP2E1	Advanced Mechanics of Solids	3-1-1	PE1
2.	DTP2E2	Fatigue Creep and Fracture	3-1-1	PE1
3.	DTP2E3	Mechanism and Robot Kinematics	3-1-1	PE1
4.	DTP2E4	Thermal Systems : Simulation and Design	3-1-1	PE1
SEM III				
1.	DTP3C1	Machinery Fault Diagnosis and Signal Processing	3-1-1	PC4
2.	DTP3C2	Advanced Refrigeration and Air Conditioning	3-1-1	PC5
3.	DTP3GX	Generic Elective II	3-1-0	GE2
4.	DTP3V3	Comprehensive Viva III	0-0-2	
Total Credit for SEM III			14 actual + 2 Virtual credits	
SEM IV				
1.	DTP4C3	Computer Aided Modeling and Simulation	3-1-1	PC6
2.	DTP4EX	Elective II	3-1-1	PE2
3.	DTP4W2	Seminar/ Res. Tool/Work Shop-2	0-2-0	
4.	DTP4V4	Comprehensive Viva IV	0-0-2	
5.	ASP4S2	Soft Skills -2	2-0-0	
Total Credit for SEM IV			14 actual + 2 Virtual credits	
<i>List of Generic Elective II</i>				
1.	DTP3G1	Advanced Heat Transfer	3-1-0	GE2
2.	DTP3G2	Rapid Prototyping	3-1-0	GE2
3.	DTP3G3	Cogeneration and Waste Heat Recovery	3-1-0	GE2
4.	DTP3G4	Mechatronics in Manufacturing Systems	3-1-0	GE2

List of Elective II

1.	DTP4E1	Machine Vibrations Analysis	3-1-1	PE2
2.	DTP4E2	Experimental Stress Analysis	3-1-1	PE2
3.	DTP4E3	Applied Elasticity and Plasticity	3-1-1	PE2
4.	DTP4E4	Automotive Systems: Analysis and Design	3-1-1	PE2
SEM V				
	DTP5D1	Dissertation Phase I	0-0-12=12	
	DTP5V5	Comprehensive Viva V	0-0-4=4	
Total Credit for SEM V			12 actual + 4 Virtual credits	
SEM VI				
	DTP6D2	Dissertation Phase II	0-0-12=12	
	DTP6V6	Comprehensive Viva VI	0-0-4=4	
Total Credit for SEM VI			12 actual + 4 Virtual credits	
Total Credits			80 actual + 16 Virtual credits	

M.E Programmes

PROGRAMME OUTCOMES (PO)

PO1: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

PO2: Identify, critically analyse, formulate and solve engineering problems with comprehensive knowledge in the area of specialization.

PO3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, manufacturing, IT, cultural, societal, and environmental considerations.

PO4: An ability to contribute by research and innovation to solve engineering problems.

PO5: Function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude.

PO6: Communicate effectively on complex engineering activities with the engineering community and able to write effective reports and design documentation, make effective presentations.

PO7: Demonstrate a knowledge and understanding of management and business practices and to develop entrepreneurship skills.

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Program Specific Outcomes (PSOs) of M.E. (Design & Thermal)

The students having Post Graduation in the discipline of Design & Thermal will attain:

PSO1: Excellence in application of the concepts of tribology and machine design on the various operations in industries. Students will achieve capability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

PSO2: Excellence in applying principles for thermodynamic analyses of various thermodynamic air standard cycles/heat engines under maximum power output conditions. Moreover students will be able to evaluate the efficiency of the cycle under maximum power output conditions .

PSO3: Excellence in Optimization of various thermodynamic processes with the help of quantitative techniques. They will also be able to analyze, interpret and provide solutions to the actual thermodynamic cycles/processes.

Academic Year: July-2016 to June-2017
 Programme: B.E II
 Branch : Computer Engineering

S.No	Course Code	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
		Course Name	Course Code	Course Name	Course Code	
1	2AM201	Applied Mathematics -III	ACR3C1	Applied Mathematics-III		60%
2	2CO254	Object Oriented Programming	CER3C2	Object Oriented Programming		15%
3	2CO202	Data Structure using C	CER3C3	Data Structures		10%
4	2ET204	Digital Electronics	CER3C4	Digital Electronics		0%
5	2CO205	Digital computer Organization	CER3G1	Computer Organisation & Architecture		50%
6			SCR3S3	Environmental Studies		100%
7			CER3L1	Computer Hardware Lab		100%
8	2CO251	Discrete Structures	CER4C1	Discrete Structures		30%
9	3CO202	Operating System	CER4C2	Operating Systems		0%
10	3CO204	Principles of Programming Languages	CER4C3	Abstraction & Paradigms for Programming		40%
11	3CO255	Database Management System	CER4C4	Database Management Systems		10%
12	2SS057	Engineering Economics	SCR4V4	Engineering Economics		30%
13			CER4G2	Digital signal Processing		100%
14			CER4L2	Hands-on Android Programming		100%
15	2CO206	IT Workshop				
16	2ET255	Microprocessors & Assembly Language Programming				
17	2SS007	Effective Communication Skills				
18	2CO203	Business data processing				
Average % change in BE program = Total average / 4 =						46%
Average % change =						11.50%

Siv. Rakerar

Ajith V F
5-12-18

STC
5/12/18

Navin
5/12/2018

Shanvi

Shanvi

Pransav

Shanvi

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ACR3C1 APPLIED MATHEMATICS – III	L	T	P	L	T	P	Total
		3	1	0	3	1	0
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.
- The optimization techniques make the students aware of the various techniques, which provides an analytical and objective basis for decisions.

Prerequisites: Matrix, probability theory, elementary statistics.

UNIT-I

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation: Gauss-Seidel, Gauss Jacobi's and relaxation methods.

Numerical solution of first order ordinary differential equations by Euler's and Runge's methods.

UNIT-II

Interpolation: Finite difference operators, Newton's and central difference interpolation formulae, divided differences, Lagrange's interpolation.

Numerical differentiation using newton's formulae, maxima and minima.

Numerical integration- general quadrature formula, trapezoidal rule, Simpson's 1/3 and 3/8 rules, Weddle's rule.

UNIT-III

Correlation and regression analysis – linear correlation and regression, regression plane, multiple and partial correlation.

Random variables-discrete and continuous random variables, probability and density functions, cumulative distribution function, mathematical expectation, normal distribution.

UNIT-IV

Testing of hypothesis- parameter and statistics, sampling distribution of a statistic, standard error, null and alternative hypothesis, test of significance of large samples and small samples, test of goodness of fit and independence of attributes.

UNIT-V

Random (stochastic) processes and their classifications, special random process –Markov process, Markov chain, classification of Markov chains-regular, homogeneous, irreducible (ergodic) and reducible Markov chains, classification of states-period and aperiodic, persistent (recurrent) and transient, absorbing states, steady state distribution.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.
- Use optimization techniques to provide a mathematical model to represent complex functional relationships.

Books Recommended:

1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
3. Gupta P.P., Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
4. T Veerarajan, Probability, statistics and random processes, 2nd edition, Tata McGraw-Hill, New Delhi, 2005.

Devi Ahilya University, Indore, Institute of Engineering & Technology				BE II Year (Computer Engineering)					
Subject Code & Name	Instructions Hours per Week			Mark s					
2AM201 Applied Mathematics- III	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: The course aims at making the students familiar about some Special Functions, useful in particle physics, Spectral and Pseudo spectral approximations, Quantum optics etc. and the most basic numerical methods and concepts like error estimation, order of convergence, stability etc. helpful in various fields of engineering and science. Software like Matlab, MathCAD, Mathematica etc. can be used to simulate the results of various numerical methods.

Prerequisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and differential equation.

COURSE OF CONTENTS

UNIT I

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton- Raphson method, Direct iterative method, Graffe's root squaring method.

Solution of system of linear algebraic equation: Matrix inversion method, Gauss- elimination Method, Jordan's method, Crout's method. Gauss-Seidel and Gauss Jacobi's iterative method.

UNIT-II

Difference equation: Definition of difference equations, formation of difference equation.

Solution of difference equations: Solution of Homogeneous and non-homogeneous difference equation with constant and variable coefficients using Boole's operator method and generating functions. Simultaneous difference equation.

UNIT-III

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals. Divided differences and central differences.

Numerical differentiation and integration: Differentiation using forward, backward and divided difference General quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.

UNIT- IV

Numerical solution of I order ordinary differential equation: solution by Euler's, method Euler's Modified method Taylor's series. Picard's successive approximation, Runge-kutta method. Milne's Predictors and Correctors method.

Differential equation of second order: Numerov's methods.

UNIT- V

Series solution of ordinary differential equations:Method of Frobenius. Series solution of Bessel and Legendre's differential equations.

Special function:Bessel's functions and Legendre's polynomials. Their recurrence relations, generating functions and orthogonal properties, Beta and Gamma Function.

BOOKS RECOMMENDED

[1]Francis J. Scheid, Schaum's *Outline of Numerical Analysis*, McGraw-Hill, New York,1989.

[2] Gupta P.P.& Malik G.S., *Calculus of Finite Differences and Numerical Analysis*, Krishna Prakashan Mandir, Meerut, 21/e,2006.

[3]B.S.Grewal, *Engineering Mathematics*, Khanna Publishers, 12/e,2006.

[4]S. S. Sastry, *Engineering Mathematics*, Vol I, II Prentice Hall Publication, 3/e,2004.

[5] C.Ray Wylie & Louis C. Barretle, *Advanced Engineering Mathematics*, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER3C2 OBJECT ORIENTED PROGRAMMING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide the knowledge of Object Oriented Programming Paradigm.
2. To learn basic constructs of programming language that are implementing tools for object oriented program development.
3. To develop skill to analyze and code for problem solution in object oriented approach.

Pre-requisites : Basic skills of Programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming: Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT-II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

UNIT-III

Inheritance and Polymorphism : Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and Packages.

UNIT-IV

Exception Handling and Multithreading: Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating custom exceptions. Multithreading: Introduction, Priorities and scheduling, Inter-thread communication, Thread Synchronization and its life cycle.

UNIT-V

Java I/O, Applets and Event Handling: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Analyze and code the solution to problem using object oriented paradigm.
2. Understand Java language constructs.
3. Apply object model for software development

BOOKS RECOMMENDED:

- [1] Cay S.Horstmann, *Core JAVA Vol-1*, 9/e, Pearson Education 2012.
- [2] Herbert Schildt, *The complete Reference*, 9/e, Tata McGraw Hill 2014.
- [3] Scott W Amber, *The Object Primer*, 3/e, Cambridge 2004.
- [4] Timothy Budd, *Object Oriented Programming*, 3/e, Pearson Education 2002.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2/e , Oreilly Publications 2005.

List of Practical Assignment:

1. Experiments to understand program development environment for Java language.
2. Writing program to learn basic language constructs like identifier, variables, data types and console input/output..
3. Writing program to learn control statements.
4. Writing program to use class and objects to model problem domain entity in program domain.
5. Writing program to use inheritance and polymorphism features.
6. Programs to use exception and understanding modeling errant condition in execution as class and objects.
7. Experiments to learn Multi-Thread execution.
8. Writing program to code applications needing concurrency and exploring inter-thread communication mechanism.
9. Experiments to understand stream concept and study various stream abstractions and implementation available in the language
10. Exploring GUI components and understanding Event Delegation Model. Understanding (GUI) objects and their communication based program to realize object oriented programming in action.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P	TH	CW	SW	PR	Total	
2CO254 Object Oriented Programming	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: To familiarize with the Object oriented concepts through Java programming.

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit I

Introduction to Object Oriented Programming:

Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

Unit II

Introduction to Java classes and objects:

Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

Unit III

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

Unit IV

Exception Handling and Multithreading:

Exceptions: Need for exceptions, Checked Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle.

Unit V

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

BOOKS RECOMMENDED

- [1] Cay S. Horstmann, *Core JAVA Vol-1*, Pearson Education.
- [2] Herbert Schildt, *The complete Reference*, Tata McGrawHill
- [3] Scott W Amber, *The Object Primer*, Cambridge
- [4] Timothy, Budd, *Object Oriented Programming*, Pearson Education.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, Oreilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER3C3 DATA STRUCTURES	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

Prerequisites : Computer Programming knowledge

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations : static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree & its applications, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs – BFS, DFS, Shortest path in graphs, Applications.

Learning Outcomes :

Upon Completing the Course, Students will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem..
4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983.
- [2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
- [3] Kruz, Data Structure and Programming Design, 1987.
- [4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
- [5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)						
Subject Code & Name	Instructions		Hours per Week		Marks					
2CO202 Data Structure Using C	L	T	P			TH	CW	SW	PR	Total
	4	-	2		Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: Gain the knowledge of useful data structure, their implementations, and associated algorithms

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Array and Link list: **Array:** Definition, Representation, Address Calculations; Searching Linear search, Binary search, Hash Search; Sorting: Bubble sort, Insertion sort, Selection sort, Heap sort, Quick sort, Radix sort, Shell sort, Merge sort, Link List: Introduction, Single Link list, Single Circular link List, Doubly link list, Doubly Circular link list.

Unit-II

Stack: Definition, Representations: static and dynamic, Infix, Prefix, and Postfix expressions, Conversion of Infix to Postfix, Evaluation of Postfix expression, Implementation of recursion, removal of recursion.

Unit-III

Queue: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, applications of queues.

Unit-IV

Tree: Definition, Basic terminology, Binary tree, Complete Binary Tree, Full Binary Tree ; representations: Static and dynamic, Traversing in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree, B*tree, B*tree.

Unit-V

Graph: Definition, Basic terminology, Directed and Undirected graph, Connected and Disconnected Graph, Weighted graph, Representations: static, dynamic and mix; Searching in graphs, finding shortest path in a weighted graph, Applications of graph.

BOOKS RECOMMENDED

- [1] E Horowitz & Sahni, *Fundamental Data Structure*, Galgotia Book Source, 1983.
- [2] A Tannenbaum, *Data Structure Using C*, Pearson Education.
- [3] Kruz, *Data Structure and Programming Design*, 1987.
- [4] N. Wirth, *Algorithms + Data Structure = Program*, Prentice Hall of India, 1979.
- [5] A V Aho, J E Hopcroft & J D Ullman, *The Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)						
Subject Code & Name	Instructions		Hours per Week		Marks					
2CO203 Business Data Processing	L	T	P			TH	CW	SW	PR	Total
	4	-	2		Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: Learn the fundamentals of analysis, design and implementation of Business Information Systems.

Prerequisite(s): Computer Programming

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER3C4 Digital Electronics	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To provide knowledge of different data representation systems for digital computers.
- Familiarize students with different hardware implementation techniques of different logic functions.
- Develop skills to design and implement various combinational and sequential circuits
- Develop ability to implement digital circuits in various practical applications.
- Provide knowledge of data converters and basic understanding of Microprocessors

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's - speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters.

UNIT-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri-state Devices, Combinational circuit design for Adder, Subtractor, Comparator, Code converters.

UNIT-III

Sequential Circuits: Latches and Flip-Flops SR, D, T, JK, Master-slave , Flip- Flop conversions, Synchronous counter, Asynchronous counter, Up-Down Counter.

UNIT-IV

Registers: Shift Registers, serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register, Sequence Generators, Designing of Synchronous & Asynchronous sequential circuits.

UNIT-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, Conversions as Flash type, Counter type, Successive Approximations type A/D converter, Clock generation through IC555, Memory- Types ROM, RAM, Introduction to Microprocessor, Microprocessor Evaluation, Programming and hardware model of Microprocessor, 8/16/32/64 bit Series of Microprocessors.

Learning Outcomes :

Upon completing the course, students will be able to:

- Understand how to represent data in digital form.
- Understand driving capacity of a gate and voltage-current parameters
- Design and Analyse any combinational and sequential digital circuit
- Using analog to digital and digital to analog IC's for data conversion.
- Understand basics of microprocessors

BOOKS RECOMMENDED:

1. Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
2. William H. Gothmann, *Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition, Prentice-Hall of India Private Limited, New Delhi, 2001
3. William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
4. S Salivahan, S Arivazhagan "Digital Circuit and Design" Vikas Publication
5. Ramesh S. Gaonkar, *Microprocessor, Architecture, Programming, and Applications with the 8085*, Penram International Publication.

List of Practical Assignment:

During the learning of course, students need to do assignments:

- a. To Implement various gates using universal NAND/NOR IC's.
- b. To Design and Implement various combinational circuits using gate IC's.
- c. To Design and Implement various combinational circuits using Mux, D Mux, Encoder, Decoder IC's. To learn and analyze different Flip-Flops.
- d. To Design and Implement various sequential circuits using Flip-Flop.
- e. To learn and analyze Counter IC's.
- f. To Design and Implement various sequential circuits.
- g. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
- h. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)						
Subject Code & Name 2ET204 Digital Electronics		Instructions Hours per Week			Marks					
		L	T	P		TH	CW	SW	PR	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objective:Get acquainted with different number systems, their Interconversion and operations. Familiarized with different logic families & relative performance Ability to design various combinational circuits by solving & reducing Boolean equations Ability to synthesis, design and analysis of sequential circuits using Xilinx tools. Understandability of converting analog signal to digital and vice versa. Synchronization and frequency division circuits. Ability to test digital circuits and estimating reliability.

Prerequisite(s):Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE OF CONTENTS

Unit –I

Introduction to Binary System:Number System, Number base conversion, Binary Arithmetic, Various Binary codes, **Logic Families:-** RTL, DTL, ECL, IIL, TTL & CMOS families

Unit-II

Combinational Circuits:Combinations Logic, Design principles, Analysis and Synthesis Tools & Techniques, Combinational logic design practices like, combinational PLDs,Decoders,Encoders,3-state Devices, Arithmetic Circuits like Adder, Subtract or, Multiplier, Divider, Comparators for signed and unsigned numbers Practical Designing of combinations circuits design using EDA Software

Unit-III

Sequential Circuits:Sequential Logic Design Practices: Latches and Flip-Flops, Sequential PLDs, Counters, Shift Registers. Sequential Design Methodology, Impediments to Synchronous Design, Synchronizer Failure and Met stability. Sequential Circuit Design Examples Using EDASoftware

Unit-IV

Registers:Shift Registers, Universal Shift Registers, Shift-Register Counter, Sequence Generators. Memory Devices: Classifications, Static and Dynamic RAM, ROM, Memory Decoding & Expansion CPLDs and FPGAs: Xilinx family, function-block architecture, programmable interconnects.

Unit-V

Digital Circuits: Digital to Analog Conversions:using Pulse width Modulator, Over sampling DAC, Binary Weighted DAC,R-2R Ladder, Thermometer Coded DAC,Segmented DAC,Hybrid DAC.

Analog to Digital Conversions:using Direct Conversions, Successive Approximations, Delta Encoded, Ramp Compare, Pipeline Method, Sigma Deltamethods.

Counting and Timing Circuits:Using decade counters with & without feedback, vernier counting

Synchronization and Frequency division circuits:using sweep circuits, stable & Monostable Relaxation circuits, study of sine wave synchronization. Monostable, Bistable & Stable multivibrators: using 555, transistor Testing of Digital Circuits: Tools, Design of Testability, Estimating Digital system Reliability, Transmission lines, reflections and termination.

BOOKS RECOMMENDED

- [1] John F. Wakerly,*Digital Design: Principles & Practices*, PearsonEducation,2003
- [2] Richard F.Tinder,*Engineering Digital Design, 2/e*, Harcourt India Private Ltd.,2001
- [3] William I. Fletcher,*An Engineering Approach to Digital Design*, PearsonEducation
- [4] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern EconomyE d i t i o n , Prentice-Hall of India Private Limited,NewDelhi.,2001
- [5] Jacob Millman & Herbert Taub,*Pulse,Digitaland Switching Waveforms*,13th Reprint,Tata McGraw Hill Publishing Company Ltd.,NewDelhi,1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER3G1 COMPUTER ORGANIZATION & ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide a framework for understanding the fundamentals of computing.
- To familiarize students with relationship between hardware and software to focus on the concepts that are the basis for current computers.
- Develop skills to understand how to design a computer.
- Develop ability to understand how to enhance performance of a computer system.

Prerequisites: NIL

COURSE CONTENTS

Unit-I

Introduction: Difference Between Computer Organization and Computer Architecture, Computer Types, Flynn's Classification, Functional Units, Basic Operational Concepts: Bus Structures, Software; Performance: Processor Clock, Basic Performance Equation, Clock Rate, Compiler, Performance Measurement; Multiprocessors and Multicomputers, Historical Perspective: Generation of computer, Evolution of Performance; Arithmetic for Computers: Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Booth Algorithm, Floating Point Arithmetic: Addition and Multiplication.

Unit-II

Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory; Memory Speed, Size and Cost Considerations; Cache Memories: Mapping Functions, Replacement Algorithms, Performance Considerations, Hit Rate and Miss Penalty, Caches on the Processor Chip; Virtual Memories: Address Translation; Memory Management Requirements.

Unit-III

Processing Unit: Addressing Modes, Connections between the Processor and the Memory, Processor Activity, Instruction cycle, John Von Neumann Architecture, State Machine Concept, Processor as a State Machine, Data Path Architecture, Data Path Controller: Microprogrammed; Hardwired Design, Firmware Design, Microcontroller Design, Design of Flip-Flop to understand the Design of CPU.

Unit-IV

Input Output Organization: I/O Devices: Introduction, Typical Collection, Diversity; Dependability, Reliability, Availability, Disk Storage, Flash Storage, Connecting Processor Memory and I/O Devices, Connection Basics, Interfacing I/O Devices to the Processor Memory and Operating System: Giving Commands to I/O Devices, Communicating with the Processor, Interrupt Priority Levels, Transferring the Data between a Device and Memory, Direct Memory Access and

the Memory System; I/O Performance Measures, Impact of I/O on System Performance.

Unit-V

Pipelining & Multiprocessors: Principles of Pipelining, Principles of Linear Pipelining, Clock Period, Speedup, Efficiency, Throughput, Classification of Pipeline Processor, General Pipelines and Reservation Tables, Collision Vector, State Diagram for a Pipeline, Pipeline Hazards, Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors, Introduction to Graphics Processing Units, Introduction to Multiprocessor Network Topologies.

Learning Outcomes:

Upon completing the course, students will be able to:

- Acquire advance knowledge and understanding of computing.
- Use skills in computer design.
- Apply acquired knowledge to improve performance of a computer.
- In addition to development in technology student will be able to innovate in the architecture of computers, such as the use of caches and pipelining.

Books Recommended:

1. Computer Organization, 5th Ed., C. Hamacher, Z. Vranesic, S. Zaky, McGraw Hill International Edition 2002.
2. Computer Organization and Design, 5th Ed. ,David A. Patterson, John L. Hennessy, The hardware/software interface, Morgan Kaufmann Publisher, 2014.
3. Patterson & Hennessy, Computer Organization and Design, Morgan Kaufmann Publisher, 2007.
4. Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Briggs, McGraw Hill Education, 2012.

List of Assignments (Theory):

During the learning of course, students need to do assignments:

1. Performance measurement of a Computer.
2. Arithmetic for Computers.
3. Cache Hit Rate/Miss Penalty issues.
4. Virtual Memory : Address Translation.
5. Use of Addressing Modes.
6. Study on designs of CPU.
7. Secondary storage performance.
8. Impact of I/O on system performance.
9. Pipelining performance.
10. Multi-core, GPU Processor and Multiprocessor : A Comparison.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)						
Subject Code & Name		Instructions Hours per Week			Marks					
2CO205 Digital Computer Organization		L	T	P		TH	CW	SW	PR	Total
		4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours					Min	35	25	-	-	60

Course Objectives:Familiarize with the internal working of modern computer systems

Prerequisite(s):Computer Programming

COURSE OF CONTENTS

Unit I

Computer Structure Overview, Addressing Methods & Program Sequencing

Overview, Operational Concepts, Von-Neuman model, Bus Structures, Software, Performance, Addressing Methods – Memory locations, Addresses & Encoding of Information, Main Memory Operations. Instruction Sequencing – Straight line Sequencing, Branching. Addressing Modes, Basic I/O Operations, Stack and Queues, Subroutines etc.

Unit II

The Processing Unit

Processor Organization, Operational Concepts, Instruction Execution, Hardwired Control, Microprogram Control- Microinstructions, Microprogram Sequencing etc. Performance Considerations etc.

Unit III

Input-Output Organization

I/O Device Access Methods, Interrupt Handling, Device Handling, Exception Handling, Direct Memory Access, I/O Hardware – Processor Bus, Interface circuit etc. I/O Interfaces – SCSI Bus etc .

Unit IV Memory System

Introduction, Types of Memory - RAM, ROM etc. Operational Concepts, Cache Memory - Mapping, Replacement Algorithms, Types. Performance Considerations etc.

Unit V

Arithmetic Operations and Pipelining

Number Representation, Addition, Multiplication of Positive Numbers, Signed-Operand Addition and Multiplication, Adder Design, Floating-Point Numbers- Arithmetic Operations, Implementation etc. Pipelining – Introduction, Operational Concepts, Data Dependency etc.

BOOKS RECOMMENDED

- [1] V. Hamacher, S. Zaky, *Computer Organization*, Mcgraw Hill International, FifthEdition.
- [2] William Stallings, *Computer Organization and Architecture*, Prentice Hall of India, SixthEdition.
- [3] A. Tannenbaum, *Structured Computer Organization*, Pearson Education, 2002.
- [4] Patterson & Hennessy, *Computer Organization and Design*, MorganKaufmann, 2007

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SCR3S3 Environmental Studies	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2

Learning Objectives: The Solving the e-Waste Problem (StEP) Initiative, an organization composed of various UN agencies, NGOs and companies working in the Information and Communication Technology Sector & to create understanding of Basel Ban form an effective and sustainable means of addressing the health and environmental problems caused by the export of e-waste from developed countries to developing nations

Pre requisites: Basic Knowledge about Electronic & Electrical components.

COURSE CONTENTS

UNIT-I

Introduction - What is & how is Electronic Waste generated, Toxins in E-waste , issues, Business Model, Basel Convention, Basel Ban.

UNIT-II

Classification of E-Waste - Composition of E-Waste, Components of E-Waste, Possible hazardous substances present in e-waste, E-waste scenario, Basis for Defining e-waste, Proposed definition of E-Waste, RoHS in the Electronic & electrical Equipments ,EPR.

UNIT-III

Legal Framework - The Hazardous Wastes (Management and Handling) Rules, The Municipal Solid Wastes (Management and Handling) Rules, Basel Convention, European Union policy and regulation on e-waste, US Policy for E-Waste

UNIT-IV

The Global Impact of E-waste - E-waste management in India, Global E-Waste Management, Analysis of systems and best practices

UNIT-V

Recycling From E-waste to Resources - Perspectives of WEEE/E-waste Management, Fundamentals Of E-Waste Recycling, Markets For Recycling Technology, Application Of A “technology Transfer Framework” For Selected Recycling Technologies, Innovation Hubs And Knowledge Centres Of Excellence In Emerging Economies

Learning Outcomes:

- Students will have knowledge about controlling E-waste & business models available.
- Students will have insight about recycling the E-waste.
- Students will have information about the different authorized E-waste collectors and government policies.

Books Recommended:

- Products From Waste (Industrial & Agro Waste) 2nd Edition
Author: NIIR Board ISBN: 818662337X
- Modern Technology of Waste Management: Pollution Control, Recycling, Treatment & Utilization
Author: NIIR board ISBN: 8178330849
- The Complete Book on Managing Food Processing Industry Waste
Author: H. Panda ISBN: 9788178331454
- The Complete Technology Book on E-Waste Recycling (Printed Circuit Board, LCD, Cell Phone, Battery, Computers)
Author: NPCS Board of Consultants & Engineers ISBN: 9788178331577

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER3L1 Computer Hardware Lab	0	0	2	0	0	1	1

Learning Objectives:

1. To provide the knowledge of computer Hardware parts and latest technology.
2. To give basic Knowledge of working internal part of system.
3. To develop skill to analyze and find the fault in System.
4. To know how to assembling the hardware parts.

Pre requisites : NIL

COURSE CONTENTS

UNIT-I

Central Processing Unit - Basics of Processor and Computer Generation, Study of Different Processor, Pentium, Dual Core, Quad Core , I3, I5, I7 Processor, Motherboards, Chipset and Controllers, BIOS and the Boot Process.

UNIT-II

Internal Components - IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Internal Ports, Cables and Connector Types, SMPS.

UNIT-III

Computer Peripherals - Monitors:- CRT, LCD and LED Displays, Printers:- Dot-Matrix Printer, Inkjet Printer, Laser Printer

Scanner:- Photo Scanner, Documents Scanner, Bar Cord Scanner, Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.

UNIT-IV

Memory and Networking Devices - Computer memory: Primary Memory- RAM, ROM, Secondary memory, Switches, Routers, Modems.

UNIT-V

Assembling and Installation - Assembled the Hardware Parts, Different types of Operating systems, System files FAT and NTFS, DOS, Windows XP, Windows Vista, Windows 7 and Windows 8 and Red Hat Linux and Multi Boot Operating System and latest OS.

Learning Outcomes:

Upon Completing the Course, Student will able to: learn the knowledge of hardware parts and Assemble a computer System and Installation & Uninstallation of Software.

BOOKS RECOMMENDED:

- [1] PC AND CLONES Hardware, Troubleshooting and Maintenance B. Govinda rajalu, Tata Mc-graw-Hill Publication
- [2] PC Troubleshooting and Repair Stephen J. Bigelow Dream tech Press, New Delhi.
- [3] Windows XP Professional and Windows 7 Edition By BPB Publication.
- [4] Red Hat Linux By BPB & SYBEX publication.

List of Assignments:

1. To study motherboard.
2. Study of Processor.
3. To study SMPS and UPS.
4. To study the CD-ROM and DVD-ROM.
5. To study working of keyboard and mouse.
6. To study different ports and slots.
7. To study various types of Cables & Connectors.
8. Study of monitors.
9. To study different types of printers.
10. DOS Commands (Internal and External).
11. To study Floppy Disk Drive.
12. Installation of different Operating Systems.
13. Installation of different device drivers.
14. Installation of different Application Softwares.
15. Assembling and Disassembling of a Computer System.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C1 DISCRETE STRUCTURES	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science.
- Provide the fundamentals of formal techniques for solving the problems in mathematical reasoning, combinatorial analysis, discrete structures, algorithmic thinking, and applications and modelling.

Prerequisites: Nil

Course Contents

Unit-I

Sets: Algebra of sets, laws of sets, computer representation, cardinality of a set, principle of inclusion-exclusion.

Functions: Characteristic function of a set, floor and ceiling functions, mod function, hashing function.

Relations: Binary Relation, properties, closure of a relation, equivalence and partial order relations, partially ordered set, Hasse Diagram, totally ordered set, maximal and minimal elements, upper bound, lower bound, greatest lower bound and least upper bound, lattice, sub lattice, properties of lattices, distributive lattices, complemented lattices, modular lattices, topological sorting.

Unit-II

Propositional Logic: Proposition, logical connectives, bit operations, conditional and bi-conditional propositions, logical equivalence, algebra of propositions, tautology, contradiction and contingency, normal forms, logic in proof, predicates and quantifiers, rules of inferences, Applications of propositional logic to logic puzzles, Boolean searches, logic circuits and system specifications.

Unit-III

Mathematical Induction: Strong induction, well-ordering, Recursive definitions.

Advanced Counting techniques: Pigeon-hole principle, sequences and summations, generating functions.

Recurrence relations:-Formation, methods of solution and application.

Unit-IV

Graph Theory: Terminology, graph representation-incidence and adjacency matrices, walk, path, cycle, graph isomorphism, connectedness, Euler & Hamiltonian graphs, planar graph, graph coloring, shortest paths algorithms.

Trees: Terminology, spanning trees, minimum spanning trees, tree traversals; prefix codes.

Unit-V

Binary operation, groupoid, semi group, monoid, group, subgroup, cyclic group, permutation group, definition and examples of Rings, Integral domain and Fields; Application to coding theory.

Boolean Algebra-Definition, laws of Boolean algebra, Boolean functions, sum of products and product of sum form, normal form, simplification of Boolean function by algebraic method, Boolean expression for logic and switching network, Karnaugh Map Method for simplification of Boolean expressions.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn a particular set of mathematical facts and know how to apply them.
- Think logically and mathematically.
- Use and analyze recursive definitions.
- How to count some different types of discrete structures.
- Techniques for constructing mathematical proofs and to reason about the efficiency of an algorithm.

Books Recommended:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Edition 2007.
2. Kolman, Busby & Ross, Discrete Mathematical Structures, 6th edition, Pearson Education, 2008.
3. C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
4. Trembley and Manohar, Discrete Mathematical structures for Computer Science, McGraw Hill, 1986.
5. Edgar G. Goodaire, Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd edition Prentice Hall, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)					
Subject Code & Name	Instructions			Marks					
	Hours per Week			Th	CW	SW	Pr	Total	
2CO251 Discrete Structures	L	T	P	Max	100	50	-	-	150
	4	-	-	Min	35	25	-	-	60
Duration of Theory Paper: 3 Hours									

Course Objectives: To provide the fundamentals of formal techniques for solve the problems in computational domain and algorithm development

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Set Theory & Logic

Set theory: Set representation; Set operations and Algebra; Principle of Inclusion-Exclusion.

Mathematical induction: Strong induction; Well-ordering; Recursive definitions.

Propositional Logic: Representation; Logic connectives; Truth tables; Deduction; Syllogism; Arguments.

Unit-II

Counting: Fundamental laws of product and sum; Permutations & Combinations. Other counting techniques; Combinatory.

Relations: Relations and their properties; n -ary relation and their applications; Representing binary relations; Closures of relations; Equivalence, Partial ordered and Compatible relations.

Function: Types of functions; Hashing; Pigeon-hole principle.

Unit-III

Graph Theory: Terminology; Graph Representation; Graph isomorphism; Connectedness; Various graph properties; Euler & Hamiltonian graph; shortest paths algorithms.

Trees: Terminology; Tree traversals; prefix codes; Spanning trees; Minimum spanning trees.

Unit-IV

Overview of the topics: Automata & Grammar; Analysis of algorithms; Generating functions; Recurrence Relations; Fuzzy logic.

Unit-V

Algebraic system-I: Groups & Group Codes; Rings, Fields & Integral domains.

Algebraic system-III Lattices and Boolean algebra: Gate Algebra; Logic Algebra; Switching Algebra.

BOOKS RECOMMENDED

[1] C L Liu, *Introduction to Discrete Mathematics*, McGraw-Hill, 1986 (Reprint by Tata McGraw Hill, 2007).

[2] K Rosen, *Discrete Mathematics and its Applications*, 6/e (Special Indian Edition), Tata McGraw-Hill, 2007.

[3] B Kilman, R Busby, S Ross, N Rehman, *Discrete Mathematical Structures*, 5/e, Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C2 Operating Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	4+1(P)

Learning Objectives: To provide an introduction to Operating System concepts and its design issues.

Pre-requisites: Computer Organization.

COURSE CONTENTS

UNIT- I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT- II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT- III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance

UNIT- IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT- V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes: To learn operating System concepts and its design issues.

BOOKS RECOMMENDED:

- [1] Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
- [2] Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
- [3] Tanenbaum, Modern Operating Systems, PHI.
- [4] W. Stalling, Operating Systems, Macmillan.
- [5] H. M. Dietel , Operating Systems, Addison Wesley Longman.
- [6] Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
- [7] Sumitabha Das, Unix Concepts & Applications: includes SCO Unix & Linux, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering)						
Subject Code & Name		Instructions Hours per Week			Marks					
3CO202 Operating System		L	T	P		TH	CW	SW	PR	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Objective:To provide an introduction to Operating System concepts and its design issues.

Prerequisite:Computer Organization.

COURSE OF CONTENT

UNIT I

Introduction

Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT II

Process Management

Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT III

Process Synchronization and Deadlock

Process Co-operation, Concepts of Interprocess communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

UNIT IV

Memory Management

Swapping, Segmentation, Paging and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT V

I/O management and other issues

Kernel, I/O hardware, I/O interfacing, I/O requesting and interrupts. Disk management: Disk Structure and Scheduling. Protection and Security. Linux: Kernel Organization, Process and resource management, Memory management, Introduction to Linux File System. Overview of Windows Operating System design.

Books recommended:

- [1]. Silberschatz, Galvin and Gagne, *Operating System Principles*, 7thEd. Addison Wesley.
- [2]. Gary Nutt, *Operating Systems*, 3rdEd. Pearson Education, India
- [3]. Tanenbaum, *Modern Operating Systems*, PHI.
- [4]. W. Stalling, *Operating Systems*, Macmillan.
- [5]. H. M. Dietel, *Operating Systems*, Addison Wesley Longman.
- [6]. Maurice J. Bach, *The design of Unix Operating system*, Pearson Education, India.
- [7]. Sumitabha Das, *Unix Concepts & Applications: includes SCO Unix & Linux*, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Computer Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C3 Abstraction and Paradigms for Programming	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	4+1(P)

Learning Objectives:

To develop an understanding of different paradigms of programming languages. Students will gain both a conceptual understanding of specification and design issues in different paradigms of programming languages and their implementation

Prerequisites: Discrete Structures, Programming Fundamentals.

COURSE CONTENTS

UNIT I

Study of Programming Languages- History of Programming Languages, Features of good Language; Language Design Issues, Static and Dynamic type Checking, Type Checking : Dynamic Type Checking ,Static Type Checking, Strong Typing, Type of Bindings, Language Paradigms:-Imperative, Object Oriented, Functional Programming, Logic Programming, Parallel Programming, Concurrent Programming .Introduction to Open Source Software.

UNIT II

Programming with Python:-Basic Syntax, Variable Types, Basic Operators, Decision Making, Loops, Numbers, Strings, Lists, Tuples, Dictionary, Functions, Modules, Class/Object, Regular Expression, Database Access, Multithreading, Web programming with Python, Web Scraping, File I/O, Package Management Tools, Python Exercises

Unit III

Imperative Programming with Advanced C++: - Types and Declarations, Pointers, Arrays, Structures, Unions, Enumerations, Statements, Expressions, Functions.

Abstraction Mechanisms: Classes, Special Operators, Hierarchies, Templates, Generic Programming

Standard Template Library in C++: -

Containers: Abilities, Operations, Types. Examples: Vector, Lists, Maps and Multimaps, Unordered containers .

Algorithms: Non-Modifying, Modifying

Iterators: Input, Output, Forward, Bidirectional, Random Access. Programming Exercises.

UNIT IV

JavaScript : Overview, Syntax, Placement, Variables, Operators, Data Types Control Structures, String ,Number, Regular Expressions ,Math ,Arrays, Array Methods, Array Sort, Events, Cookies, Page Redirect, Dialog Box, Void Keyword , Page Printing, Objects, Forms, Functions, Error handling, Validation, Animation, Basics of MVC Architecture

JavaScript Frameworks : JQuery, Introduction to Node.js and Angular.js

Unit V:-

XML : Basics, Namespaces , Schema, XSLT, XPATH, Document Object Model, Simple API for XML

Learning Outcomes:

Students will able to apply different paradigms of programming languages in real world problems.

BOOKS RECOMMENDED:

- [1]T. W. Pratt, M. V. Zelkowitz, Programming Languages: Design and Implementation, 4/e, Pearson Education, 2000.
- [2]D. P. Friedman, M Wand, Essentials of Programming Languages, 3/e, MIT Press, 2008.
- [3]R. W. Sebesta, Concepts of Programming Languages, 8/e, Addison Wesley, 2008
- [4] David Hunter “Beginning XML”, Wiley Dreamtech, Fourth Edition,2007.
- [5] Kal Ahmed, Sudhir Ancha “Professional Java XML”,SPD 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering)					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
3CO204 Principles of Programming Languages	4	-	-	Max	100	50	-	-	150
	Duration of Theory Paper:3 Hours			Min	35	25	-	-	60

Objectives:To understand theoretical concepts of programming languages and expose to the students, the ideas of design and implementation of programming languages.

Prerequisites:Discrete Structures, Programming Fundamentals.

COURSE OF CONTENTS

UNIT I

Study of Programming Languages- History of Programming Languages, Features of good Language; Language Design Issues- Structure and Operation of Computer, Virtual Computers and Binding Times, Language Paradigms; Language Translation Issues- Programming Language Syntax, Stages in Translation, Formal Translation Models.

UNIT II

Data Types- Properties of Types and Objects, Elementary Data Types, Structured Data Types; Encapsulation- Abstract data Types, Encapsulation by Subprograms, Type Definitions, Storage Management; Inheritance- Abstract Data Types Revisited, Inheritance, Polymorphism.

UNIT III

Sequence Control – Implicit and Explicit Sequence Control, Sequencing with Arithmetic Expressions, Sequencing with Non arithmetic Expressions, Sequence Control between Statements; Subprogram Control – Subprogram Sequence Control, Attributes of Data Control, Shared Data in Subprograms.

UNIT IV

Advances Issues in Language Design–Variation on Subprogram Control, Parallel Programming; Formal Properties of languages, Language Semantics, Hardware Developments, and Software Architecture.

UNIT V

Scheme for B.E. III (Computer Engineering) effective from June 2008

Paradigms and Languages:

Simple Procedural Languages, Block Structured Procedural Languages, Object-based Languages, Functional Languages, , Markup languages, Query Languages; ; Case Study of C/C++, Java, XML, SQL.

BOOKS RECOMMENDED:

[1]T. W. Pratt, M. V. Zelkowitz,*Programming Languages: Design and Implementation*, 4/e, Pearson Education, 2000.

[2]D. P. Friedman, M Wand,*Essentials of Programming Languages*, 3/e, MIT Press, 2008. [3]R. W. Sebesta,*Concepts of Programming Languages*, 8/e, Addison Wesley, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4C4 DATABASE MANAGEMENT SYSTEMS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To understand the need of databases, its architecture and schemas.
- To familiarize students with representing domains using entity-relationship modelling.
- How to design a normalized schema in the relational data model.
- Develop skills in students to implement schema and query using SQL.
- Develop ability to develop database applications based on the requirements.

Prerequisites: Knowledge of Data Structures and Computer Programming and some topics of operating systems.

COURSE CONTENTS

Unit-I

Introduction: Database Environment: Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit-II

Database Analysis & Modeling: Introduction to Data Analysis and Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs- Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues.

Unit-III

Database Design: Introduction to Logical Database Design, Relational Data Model – Codd’s Rules, Relational Algebra etc.; Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc..

Unit-IV

System Implementation & Transaction Processing: Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs - Views, Triggers, Cursors etc; Transaction Processing – Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking etc.

Unit-V

Advance Topics: File Organization and Indexes, Hashing Techniques, B-trees, B+ Trees etc; Database Recovery, Database Security, Introduction to Data Warehousing and Data Mining, Emerging Database Technologies and Applications etc., Overview of MySQL.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand the fundamentals of relational database system including: data models, database architectures and database manipulations.
- Understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using DBMS such as MySQL.
- Be familiar with managing database systems.
- Understand new developments and trends in databases.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
3. A First Course in Database Systems, By J. Ullman, J. Widom, 3rd Edition, Pearson Education, 2014.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.
5. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
6. MySQL : The Complete Reference, 1st Edition, McGraw Hill Education, 2004.

List of Assignments:

During the learning of course, students need to do assignments:

1. Designing an E-R model.
2. Solving basic SQL assignments.
3. Solving intermediate SQL assignments involving Nested and Join queries.
4. Using PL/SQL constructs involving procedures, triggers, views etc.
5. Exploring how transaction processing is handled by MySQL.
6. Minor Project on developing a database application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering) Semester VI					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
3CO255 Database Management System	4	-	2	Max	100	50	50	50	250
				Min	35	25	25	25	110
Duration of Theory Paper: 3 Hours									

Objective: To gain the knowledge of Database Management System design and familiarize with database application development.

Prerequisite: Data Structures.

COURSE OF CONTENT

Unit I

Introduction to DBMS

Database Environment: Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit II

Database Analysis

Introduction to Data Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs- Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues.

Unit III

Database Design

Introduction to Logical Database Design, Relational Data Model – Codd's Rules, Relational Algebra etc. ; Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc.

Unit IV

System Implementation

Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs - Views, Triggers, Cursors etc; Transaction Processing –

Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking and Time Stamping Issues etc.

Unit V

Advance Topics

Physical Database Design – File Organization and Indexes, Hashing Techniques, B-trees, B+ Trees etc; Database Recovery, Database Security, Introduction to Data Warehousing and Data Mining, Emerging Database Technologies and Applications etc., Overview of Oracle 10i.

Books Recommended:

- [1] Elmasri ,*Fundamentals of Database Systems*–Navathe, AddisonWesley.
- [2] Macfadden,Hoffer,Prescott ,*ModernDataBase Management*–Pearson EducationAsia.
- [3] Silberchatz, Korth and Sudarshan,*Database System Concepts*Mcgraw Hill, FourthEdition
- [4] C.J. Date,*An Introduction to Database Systems*, AddisonWesley.
- [5] Connolly and Begg,*Database Systems*, PearsonEducation.
- [6] Ivan Bayross*Teach Yourself SQL & PL/SQL*, BPBPublication.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SCR4S4 ENGINEERING ECONOMICS	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

Course Contents:

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income - Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.

- Solve economical problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

Books Recommended:

- [1] C S Park, Contemporary Engineering Economics, Pearson Education, 2002.
- [2] J S Chandan, Statistics for Business and Economics, Vikas Publishing.
- [3] H. L. Ahuja, Principles of Microeconomics, S. Chand (G/L) & Company Ltd, 2002.
- [4] D. N. Dwivedi, Macroeconomics Theory and Policy, Tata McGraw-Hill Publishing Company, 2010.
- [5] S Damodaran, Managerial Economics, Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course, students need to do assignment:

- Students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches)						
Subject Code & Name	Instructions			Hours per Week			Marks			
	L	T	P		TH	CW	SW	PR	Total	
2SS057 Engineering Economics	2	-	-	Max	-	50	-	-	50	
				Min	-	25	-	-	25	
Duration of Theory Paper: Only Internal Tests										

Course Objective: To make fundamentally strong base for decision making skills by applying the concepts of economics and accounting to cope up with the current dynamic business environment

Prerequisite(s): Nil

COURSE OF CONTENTS

Unit-I

Economic Decision: Role of Engineering in Business; Concept, Nature and Scope of Economics & Business Economics; Types of Business Organizations.

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-II

Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-III

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-IV

Production Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-V

Liberalization, Globalization & Privatization: Concept & Characteristics; Evaluation of New Liberal Economic, Policy of India; Economy through Globalization.

BOOKS RECOMMENDED

[1] C S Park, *Contemporary Engineering Economics*, Pearson Education, 2002

[2] J S Chandan, *Statistics for Business and Economics*,

[3] C Dislis, JH Dick, I D Dear & AP Ambler, *Test Economics and Design for Testability*,

[4] S Damodaran, *Managerial Economics*,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4G2 DIGITAL SIGNAL PROCESSING	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objectives: To provide the analysis techniques like for discrete time system analyse the discrete time systems in time and frequency domain using Z- transform, Fourier transform, Discrete Fourier transform to learn the signal processing.

Prerequisites: Awareness about the analysis of signals and systems

COURSE CONTENTS

Unit-I

Introduction to signal processing, discrete time signals and sequence operation, properties. Discrete time systems, their properties, linear time invariant systems, convolution, properties of LTIV systems, inverse system, linear constant coefficient difference equation and their solutions.

Unit-II

Frequency Domain Representation of discrete time signals and systems, suddenly applied complex exponentials inputs, representation of sequences by Fourier transform, condition of their convergence, symmetry properties of FT, Fourier transform theorems.

Unit-III

Introduction to Z transforms, ROC and their properties, Inverse Z transform, Z transform properties, initial value theorem, structure for discrete time systems, and block diagram representation of linear constant coefficient difference equations. Signal flow graph representation of LCCDE, basic structure for IIR system, direct forms, cascade, parallel forms, transposed forms.

Unit-IV

Representation of periodic sequences, discrete Fourier series, properties of DFS, Fourier transform of periodic signals, sampling the FT, Fourier representation of finite duration sequences, the discrete Fourier transform, Circular convolution, linear convolution using DFT, implementing LTIV system using DFT.

Unit-V

Basic structure for FIR systems, direct form, cascade form structures. Efficient Computation of DFT, Goertzel algorithm, decimation in time FFT algorithm, In place Computation, alternative forms, decimation in frequency FFT algorithm, algorithm for N composite number, prime factor algorithm.

Books Recommended:

1. Oppenheim and Schafer, discrete time signal processing, 2/E PHI, 2005.
2. Proakis and Manolakis, discrete time processing, PHI, 2005.
3. S.Mitra, discrete time processing, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering)						
Subject Code & Name		Instructions Hours per Week			Marks					
		L	T	P		T H	CW	SW	P R	Tota l
3EC205 Digital Communication Engineering		4	-	2	Max	10 0	50	50	50	250
Duration of theory paper: 3Hours					Min	35	25	25	25	110

Course Objectives:

- To provide an introduction to the basic principles in analog and digital communication.
- To introduce the various processes like sampling, modulation and coding techniques, channel coding techniques etc. that are used in modern telecommunication system.
- To review the basic Fourier techniques and its application in these processes.
- To give exposure to quantitative method of measuring information and determining the capacity of communication system.

Prerequisite(s): Basic exposure to signals and systems.

COURSE OF CONTENTS

UNIT I

Review of Fourier techniques, Fourier techniques for linear system analysis, Fourier transform properties convolution, Error Function and complimentary error function, Introduction to analog modulation techniques like AM, FM, PM.

UNIT II

Line coding: NRZ, RZ, Biphase, Duo binary etc. their comparison and spectrum associated either their wave forms. Signal and Spectra: classification of signals, spectral density, auto-correlation, random signals, bandwidth of digital data.

UNIT III

Sampling and quantization, Digital coding techniques, PCM, DPCM, ADPCM, DM, ADM, Vocoders, optimum filter, matched filter. Digital modulation techniques, binary PSK, QPSK, MSK etc., performance analysis and comparison of digital modulation techniques in presence of noise.

UNIT IV

Information theory: concept of amount of information, entropy, information rate, coding to increase average information per bit, Huffman coding, channel capacity, Shannon's theorem of channel capacity.

Channel coding: Linear block codes, systematic Linear blocks codes, parity check matrix, syndrome testing, cyclic codes hamming codes.

UNIT V

Introduction to spread spectrum techniques – spread spectrum overview, pseudo noise sequence, direct sequence spread spectrum system, Frequency hopping system, synchronization, spread spectrum application, CDMA systems.

BOOKS RECOMMENDED

- [1] Taub & Schilling, “*Principal of Communication System*”, Tata McGraw Hill publication, Third edition,2007.
- [2] J.G. Proakis, “*Digital Communication*”,McGraw Hill publication, Fourth edition,2001.
- [3] Lathi B.P., “*Modern Analog and Digital Communication Systems*”,Oxford Univ. Press, Thirdedition.
- [4] Haykins Simon, “*Digital Communication*”,Wiley Publication, Third edition,2007.
- [5] Haykins Simon, “*Analog and Digital Communication*”,Wiley Publication, Third edition,2007.
- [6] Bernard Sklar, “*Digital communication*”, Pearson Education, Second edition,2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER4L2 Hands-on Android Programming	L	T	P	L	T	P	Total
	0	0	2	0	0	1	1

Learning Objectives:

- To familiarize students with Android operating systems internals.
- To learn and develop skills for developing an Android application.

Prerequisites: Knowledge of Java programming and Operating Systems basics.

COURSE CONTENTS

Unit – I

Introduction – What is Android, Installing softwares, Hello Android examples, software stack, android core building blocks, Emulator.

Unit – II

Android UI – Working with buttons & other components, Activity lifecycle, Intent – implicit and explicit, Fragment lifecycle, Android Menu, Layout manager, Adaptor and view.

Unit – III

Android Service & Data Storage – Introduction, Android service API, Android service life cycle, Shared preferences, internal storage, external storage, SQLite, XML & JSON.

Unit – IV

Android Content Provider & Notification – Contact content provider, Other built-in content providers, Understanding content URI, ContentResolver, Notification API, Setting notification properties, issuing notification.

Unit – V

Android APIs & Connectivity – Overview of TextToSpeech API, Telephony API, Location API and Sensor API, Working with WiFi and Bluetooth.

Learning Outcomes :

Books Recommended:

1. .
2. .
3. .
4. .
5. .
6. Programming Android, Z. Mednieks, L. Dornin, G. Blake, M. Nakamura, ORIELY's.

List of Assignments:

During the learning of course, students need to do assignments:

1. .
2. .
3. .
4. .
5. .
6. .

S.No	Old Scheme		New(CBES) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	3CO201	Theory of Computation	CER5C1	Theory of Computation	30%
2	3CO254	Software Engineering	CER5C2	Software Engineering	0%
3	3CO203	Computer Network	CER5C3	Computer Networks	5%
4	3CO253	Server Side Programming	CER5E1	Server Side Programming	25%
5	4CO203	Object Oriented Design	CER5G3	Object Oriented Analysis & Design	30%
6			SCR5S5	Engineering Leadership	100%
7			CER5I3	Software Lab	100%
8	2CO252	Computer Graphics	CER6C1	Computer Graphics	0%
9	3CO252	Analysis of Algorithms	CER6C2	Design and Analysis of Algorithms	10%
10	2CO253	System Programming	CER6C3	Compiler Techniques	30%
11			SCR6S6	Professional Development	100%
12			CER6E1	Data Warehousing & Mining	100%
13			CER6G4	Wireless and Mobile Networks	100%
14			CER6L4	Computer Graphics Lab	100%
15	3SS256	Entrepreneurship Development & IPR			
16	3SS206	Principles of Management			
17	3EC205	Digital Communication Engineering			
18	3CO206	Software Workshop			
Average % change in BE program = Total average / 4 =					52%
Average % change =					13%

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BB

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5C1 Theory of Computation	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Course should provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (abstract) view towards algorithmic design and in general computation itself.
2. The course should in addition clarify the practical view towards the applications of these ideas in the engineering part as well.

Prerequisite:

Students should have a background in discrete mathematics, data structures, and programming languages.

COURSE CONTENTS

UNIT-I: Finite Automata and Regular Languages

Motivation for studying theory of computation, Notion of formal languages and grammars, Kleene's Closure, Regular Expressions and Regular languages, closure properties of regular languages, Finite Automata. Finite Automata with output: Mealy and Moore machines, applications.

UNIT-II: Nondeterminism and Minimization

Nondeterministic Finite Automata, Acceptance condition. Kleene's Theorem, Myhill-Nerode relations, Minimization Algorithm, Non-Regular languages, Pumping Lemma for regular languages.

UNIT-III: Grammars and Context-Free Languages

Grammars and Chomsky Hierarchy, Context-Free Grammars, Context-Free Languages (CFLs), Inherent Ambiguity of CFLs, closure properties of CFLs, Eliminating useless symbols; null-productions; and unit productions, Chomsky Normal Form, Greibach Normal Form, Cock-Younger-Kasami (CYK) Algorithm, Applications to Parsing.

UNIT-IV: Pushdown Automata

Pushdown Automata (PDAs), PDAs vs CFLs. Deterministic PDAs and CFLs, applications, notion of acceptance for PDAs: acceptance by final states, and by empty stack; the equivalence of the two notions, Proof that CFGs generate the same class of languages that PDAs accept, Pumping Lemma for CFLs.

UNIT-V: Turing Machines and Computability

Introduction to Turing Machines, Configurations, Halting vs Looping, Turing computability, Nondeterministic, multitape and other versions of Turing machines. Church's thesis, Universal Turing Machines, Linear Bounded Automata (LBAs) and context-sensitive languages, Recursive and Recursively enumerable languages, Undecidability of Halting Problem and unsolvable problems about Turing Machines, the diagonalization language and proof that it is not Recursively enumerable.

Learning Outcomes:

After completing the course, the student will be able to:

1. Model, compare and analyse different computational models.
2. Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
3. Identify limitations of some computational models and possible methods of proving them.

4. Have an overview of how the theoretical study in this course is applicable to an engineering application like designing the compilers.
5. Have an understanding of the solvable and unsolvable problems and their computational behaviors.

BOOKS RECOMMENDED:

- [1] Daniel I.A. Cohen, Introduction to Computer Theory, John Wiley, 1990
- [2] John C. Martin, Introduction to Languages and the Theory of Computation, 3/e Tata McGraw Hill, 2005
- [3] J.E. Hopcroft and J.D.Ullman, Introduction to Automata, Languages and Computation, Narosa Publishing House, 1995
- [4] J.E. Hopcroft, Rajeev Motwani and J.D.Ullman, Introduction to Automata, Languages and Computation, Pearson Education, Asia, 2002
- [5] H.R. Lewis and C.H. Papadimitrou, Elements of the Theory of Computation, Prentice Hall Inc., 1999
- [6] M. Sipser, Introduction to the Theory of Computation, Brooks/Cole Thomson Learning, 1996
- [7] Zohar Manna, Mathematical Theory of Computation, McGraw Hill, 1997

Scheme for B.E. III (Computer Engineering) effective from June 2008

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering)					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
3CO201 Theory of Computation	4	--	--	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: - To familiarize students about theoretical & mathematical aspects of computer science and making their problem solving thinking stronger.

Prerequisite: Discrete Structures, Applied Mathematics.

**COURSE OF
CONTENT**

UNIT I

Introduction to Formal Languages, Grammar and Automata; Finite State Machines- DFA & N DFA; Regular Expressions; Properties of Regular Languages; Pumping Lemma.

UNIT II

Chomsky's Hierarchy; Context Free Languages & Grammars; Recognition, Translation and Parsing; Normal Forms of CFG; CKY and Earley's Algorithm.

UNIT III

Pushdown Automata; PDA and CFG; Nondeterministic PDA, Properties of CFLs; Pumping Lemmas; Turing Machines- TM as Language Acceptor, Transducer and Problem Solver.

UNIT IV

Predicate Calculus- Syntax and Wffs; Models of Interpretation and Semantics- Horn and Ground Clauses; Resolution Techniques.

UNIT V

Petri nets and its Applications; Programming Language Semantics; Verification of Programs; Formal and Type Systems; Computational Complexity. Complexity of Computing using HLL programs and Automata models; Formal Semantics of programming Languages; Verification of Programs.

BOOKS RECOMMENDED:

- [1] D.Mandriolli, C Ghezzi, "Theoretical Foundation of Computer Science, John Wiley, 1987.
- [2] Zohar Manna, *Mathematical Theory of Computation*, McGraw Hill, 1977.
- [3] Cohen, *Introduction to Computer Theory*, John Wiley, 1990.
- [4] Moll, Arbib, Kfoury, *Introduction to Formal Language Theory*, Springer Verlag, 1990.
- [5] P.Linz, *An Introduction to Formal languages and Automata*, 3/e, Narosa Pub. 2003.
- [6] J. Martin, *Introduction to Languages and the Theory of Computation*, 3/e, Tata McGraw Hill, 2005.
- [7] J.Hopcroft and J.D. Ullmam. "Introduction to Languages, Automata and Computation Addition Wesley, 1981.
- [8] Lewis and Papadmitrou, "Element of Theory of Computation," Printice Hall, 1981.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER5C2 SOFTWARE ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To familiarize with the process of software development life cycle using the concepts of software engineering.

Prerequisite: Knowledge of a programming language, preferably object oriented and a mid-size project work.

COURSE CONTENTS

UNIT I

Software Engineering process- Basic concepts of System Design, System :Technical and Socio Technical System, Legacy System, Layered Technology, Software Process Model: Water Fall Model, Prototype Model, Incremental Model, Spiral Model, Agile Model, Role of Software Engineer, Software Qualities and nature requirements and Measurement, Technique; other Software Engineering issues like formality, modality, abstraction, reuse, generality etc.

UNIT II

Critical System, UML, Software Process: Rational Unified Process, Software Requirements, Requirements Analysis and Principles, Requirement Engineering Process, SRS, SDS, End-user requirements, Design Modularity Design, object-orientation

UNIT III

Software Design Process: Design principles, Design Concept: Analysis Model, Design Model, Modularity, Design Methods: Data Design, Architecture Design, Interface Design, Verification goods and Requirement – Testing, Debugging Analysis, Analysis software.

UNIT IV

Software Testing Fundamentals, Black Box Testing, White Box Testing, Other Testing Methods ,Cohesion and Coupling, Verification and Validation ,Case Studies Software Engineering, Management planning control, Organization and Risk Management.

UNIT V

Software Engineering Tools – System programs, Role of Programming languages; CASE Tools; Objected Oriented software Engineering; format Methods; Reengineering process ,Client Server Software Engineering.

BOOKS RECOMMENDED:

- [1] C.Gezzi, M. Jazayeri and D. Mandriohi *Fundament of software Engineering*, PHI 1996.
 - [2] R.S. Pressman, *software Engineering A Practitioner Approach*, 4/e McGraw-Hill International Edition 1997.
 - [3] P.Jalote, *An Integrated Approach to Software Engineering*, Naresa Publishing, Latest Edition.
 - [4] Ian Sommerville, *Software Engineering*, Pearson education, 7th edition
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering) Semester VI					
Subject Code & Name	Instructions Hours per Week			Marks					
3CO254 Software Engineering	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective: To familiarize with the process of software development life cycle using the concepts of software engineering.

Prerequisite: Knowledge of a programming language, preferably object oriented and a midsize project work.

COURSE OF CONTENT

Unit I

Software Engineering process- Basic concepts of System Design; Software life cycle; role of Software Engineer; Application Domains. Software Qualities and nature requirements and Measurement. Technique; other Software Engineering issues like formality, modality, abstraction, reuse, generality etc.

Unit II

Software Design Modularity Design, object-orientation; concurrent software specification. Case Styles Operational, Descriptive Logic and Algebraic specification; End-user requirements.

Unit III

Verification goods and Requirement – Testing, Debugging Analysis, Analysis software Metrics case studies.

Unit IV

Software Engineering Process-Different Models; Process Organization; Case Studies Software Engineering, Management planning control, Organization and RiskManagement.

Unit V

Software Engineering Tools – System programs, Role of Programming languages; CASE Tools; Objected Oriented software Engineering; format Methods; Reengineering process ,Client Server Software Engineering.

Book Recommended:

- [1] C.Gezzi, M. Jazayeri and D. Mandriohi *Fundament of software Engineering*, PHI 1996.
- [2] R.S. Pressman, *software Engineering A Practitioner Approach*, 4/e McGraw-Hill International Edition 1997.
- [3] P.Jalote, *An Integrated Approach to Software Engineering*, Naresa Publishing, Latest Edition.
- [4] Ian Sommerville, *Software Engineering*, Pearson education , 7 th edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering((Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER5C3 COMPUTER NETWORKS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- [1] Build an understanding of the fundamental concepts of computer networking.
- [2] Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- [3] Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- [4] Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Pre requisites :

Basic knowledge of programming, Data Structures and Object Orient Programming

COURSE CONTENTS

Unit 1 - Introduction:

Definition and goals, Design issues, Network architecture-broadcast & point to point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN, WAN & MAN, protocols & services, types of service-connection oriented and connectionless, **different protocols**.
Transmission Media: Twisted Pair, Coaxial cable, Fiber optic cable, Wireless transmission, telephone system, multiplexing, switching-circuit, packet & message switching, Virtual circuit switch.

Network devices-repeater, bridge, router, gateways, network interface cards, cabling system.

Unit 2 – Data Link Layer:

Framing, Error control-Bit Error, causes of error, control methods, Flow control: Stop & wait, sliding window concept, **piggybacking**.

Local Area Network Technology: Protocols- Aloha, CSMA, CSMA/CD, Collision free protocols, **IEEE 802 protocols, standard- topologies, cabling system, Network management, MAC addressing frame format. Ethernet.**

Unit 3 – Network Layer:

Introduction, features & design issues, Routing- different routing algorithms, congestion control, Internetworking- Concepts and architecture. Addressing-IP Addressing and subnet masking, IP protocols, **Network Address Translation**, Address resolution protocol (ARP).

Unit 4 – Transport Layer:

Introduction, design issues, Transport layer addressing, buffering, multiplexing, recovery, TCP/IP suit of protocols- TCP & UDP Network applications, Connection establishment, Connection release, TCP Header.

Unit 5 – Application Layer:

Introduction to application layer, Application layer protocols: Electronic mail, File transfer, remote login, WWW, Multimedia etc. Firewalls.

Recommended Books :

- Computer Networks, Andrew. S. Tanenbaum, 4/e, Prentice Hall of India Private Ltd, 2003.
- Data Communications and Networking, Behrouz A Forouzan, 4/e, Tata McGraw Hill Education Private Limited.
- Data Communications & Networks, Achyut S. Godbole, Tata McGraw Hill Education Private Limited, 2002.
- Data and Computer Communication, William Stalling, 7/e, Prentice Hall of India Private Ltd, 2007.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- [1] Independently understand basic computer network technology.
- [2] Understand and explain Data Communications System and its components.
- [3] Identify the different types of network topologies and protocols.
- [4] Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- [5] Identify the different types of network devices and their functions within a network
- [6] Understand and building the skills of subnetting and routing mechanisms.
- [7] Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

List of Assignments:

During learning of course, students need to do assignments:

- Study of various network devices in detail.
- Study of basic network commands and network configuration commands.
- Installation of LAN card.
- Implementation of Bit Stuffing.
- Implementation of Byte stuffing.
- Implementation of error correcting codes.
- Implementation of error detection codes.
- Study of network IP.
- Implementation of various routing protocols.
- Programming with Sockets.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering)					
Subject Code & Name	Instructions Hours per Week			Marks					
3CO203 Computer Networks	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper:3 Hours				Min	35	25	25	25	110

Objective: To provide an introduction to concepts of Computer Network and its design issues.

Prerequisite: Communication System basics.

COURSE OF CONTENT

UNIT I

Introduction

Computer Network-Definition, Goals, Design Issues, Network architecture-Broadcast & Point to Point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN, WAN & MAN, protocols & services types of service-connection oriented and connection less, Transmission Media : Twisted pair, Coaxial cable, Fiber optic cable, Wire less transmission, Telephone System, Multiplexing, Switching: Circuit, Packet & Message Switching. Network Devices: Repeater, Bridge, Router, Gateways, NIC, Cabling System.

UNIT II

Data Link Layer Design and Protocols

Framing, Error control-Bit Error: causes of error, control methods, Flow control – Stop & Wait, Sliding Window Protocols, MAC Protocols: Aloha, CSMA, CSMA/CD, Collision free protocols, IEEE 802.3 standard, Fast Ethernet, Gigabit Ethernet, Overview of Wireless LANs: IEEE 802.11 standard.

UNIT III

Network Layer Design and Protocols

Internetworking: Concepts and Architecture. Routing: different routing algorithms, Congestion Control, Addressing- IP Addressing and subnet masking, CIDR, IPv6, IP protocol and other supporting protocols at IP layer: ARP, RARP, ICMP.

UNIT IV

Transport Layer Design and Protocols

Transport layer addressing, Connection Establishment and release, Buffering, Multiplexing, Crash Recovery, TCP/IP suite of Protocols –TCP & UDP, TCP: Protocol, Segment header, transmission policy.

UNIT V

Application Layer and Other Issues

Domain Name System, File Transfer Protocol, Telnet, Email: Architecture and services, HTTP, NAT, Firewall and Proxy, Network performance issues and QOS, Overview of network security.

Books Recommended:

- [8] A.S. Tanenbaum, “Computer Network” by 4th Ed Pearson Education, 2007
- [9] S. Keshav, *An Engineering Approach to Computer network*” by Pearson Education
- [10] William “Stalling Data and computer communication” 5TH Ed PHI, 1996.
- [11] D.E.Comer, *Internetworking with TCP/IP Vol. I*, 5th Pearson Education
- [12] Forouzan, “Data Communication and Networking” 4th Ed Tata McGraw Hills

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5P1 Server Side Programming	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: To learn web development using server side programming technologies and to develop skills for building web application with dynamic contents.

Pre requisites: Knowledge of Java Programming language (core), HTML, XML and basics of SQL.

COURSE CONTENTS

UNIT-I

Introduction: Introduction to HTML, HTML tags, HTML forms. HTTP protocol: HTTP request, HTTP response. Introduction to CGI, PHP, ASP and compare these server side technologies with Servlets and JSP. Web Server; web Container, overview of web application.

UNIT-II

Servlets: Basics of Web, MVC in Server side Programming, Servlet API, Servlet Interface, GenericServlet, HttpServlet, Servlet Life Cycle, Working with Apache Tomcat Server, Steps to create a servlet in Tomcat, Deployment descriptor. ServletRequest: Various Servlet Request methods for form data and HTTP header data.

UNIT-III

Session Tracking: Purpose and need of Session Tracing. Approaches to session tracking: Cookies, Hidden Form Field, URL Rewriting, Session tracking with JAVA servlet API.

UNIT-IV

Database Connectivity and Servlet Collaboration: Database drivers, JDBC, API for Querying with database, API for updating the database. Servlet collaboration: Methods of Request Dispatcher interface: forward, Include, Sendredirect.

UNIT-V

Java Server Pages: Basic of JSP: Life Cycle of JSP, JSP API. Scripting Elements: - Scriptlet Tag, expression tag, declaration tag. 9 Implicit Object: out, request, response, config, application, session, pagecontext, page and Exception. Directives: - page directive, include directive, taglib; Exception Handling, Action Elements, JSTL, Custom tags.

Learning Outcomes: To learn Server Side Programming concepts and its design and implementation issues.

BOOKS RECOMMENDED:

[1] J2EE Tutorial from <https://developer.oracle.com/technology/Java>

- [2] Jason Hunter JAVA servlet programming, , William Crawford, O'Reilly, SPD.
- [3] Professional JAVA server programming, J2EE edition, volume I, Wrox, SPD.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering) Semester VI					
Subject Code & Name	Instructions Hours per Week			Marks					
3CO253 Server Side Programming	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
	Duration of Theory Paper: 3 Hours			Min	35	25	25	25	110

Objective: To learn web development using server side programming technologies and to develop skills for building web application with dynamic contents.

Prerequisite: Knowledge of Java Programming language (core), HTML and basics of SQL.

COURSE OF CONTENT

Unit I

Introduction: HTTP protocol: Http request, Http response; web container and web server overview; web application.

Unit II

Database Connectivity with Middle tier: ~~Database drivers; API for interaction with database; Connection pooling; Transaction.~~

Unit III

Server Side Technology: ~~Comparisons of prevalent server side technologies; Servlet basics; Servlet lifecycle; Implicit objects; scope.~~

Unit IV

Session Tracking : ~~Approaches to session tracking; Session tracking with JAVA-servlet API; Servlet collaboration.~~

Unit V

JAVA Server Pages: JSP overview; Directives; Scripting elements; Standard actions, Implicit objects; Scope; XML – equivalent tags; JSP design basics; Dispatcher approach; Introduction to JSP tag extension.

~~Introduction to CGI, PHP and ASP. Comparison of these technologies with servlet and JSP.~~

Books Recommended:

- J2EE Tutorial from www.java.sun.com.
- Jason Hunter *JAVA servlet programming*, , William Crawford, O'Reilly, SPD.
- Professional *JAVA server programming*, J2EE edition, volume I, Wrox, SPD.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5G3 Object Oriented Analysis & Design	L	T	P	L	T	P	Total
		3	1	2	3	1	1
Duration of Theory Paper:3 Hours							

Learning Objectives:

1. To learn object oriented analysis, modeling and design using UML.
2. To learn object oriented approach of software engineering.

Prerequisite:

Knowledge of object oriented programming and basics of software engineering.

COURSE CONTENTS

UNIT-I

Rational Unified Process, Process Notation, **Introduction to UML**, Business Modeling Workflow, Object Oriented Analysis: Requirements Overview, Problem Statement, Glossary, Supplementary Specifications, Analysis and Design Overview; Architectural Analysis overview, Use Case Analysis: finding classes from use case behavior, describe responsibility, attribute and association; qualify analysis mechanism.

UNIT-II

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT-III

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT-IV

Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-V

Architectural Modeling:Architectural Analysis:Analysis Mechanisms, Key Abstractions, Pattern, Initial Architectural Layers,Component, Deployment, Component diagrams and Deployment diagrams.

Learning Outcomes:

After successfully completing this course you will be able to:

- [1] Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
- [2] Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language

BOOKS RECOMMENDED:

- [1] Grady Booch, Object Oriented Analysis & Design with Application, Pearson Education India 2nd Edition.
- [2] Scott W. Ambler, The Object Primer, Cambridge University Press, 2nd Edition.
- [3] Philippe Kruchten, The rational Unified Processes & Introduction Pearson Education India 2nd Edition.
- [4] Grady Booch, Games Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley
- [5] M. Blaha, J. Rumbaugh, Object Oriented Modeling and Design with UML, Pearson Education 2nd Edition,2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Computer Engineering					
Subject Code & Name 4CO203 Object Oriented Design	Periods Hours/ Week	Marks	Th	CW	SW	Pr	Total
Duration of Theory Paper: 3 Hours	Lectures- 4 Tutorials-0 Practical- 2	Max	100	50	50	50	250
		Min	35	25	25	25	110

Objective: To learn object oriented analysis, modelling and design using UML. To learn object oriented approach of software engineering.

Prerequisite: Knowledge of object oriented programming and basics of software engineering.

Course of Contents

Unit-I

Rational Unified Process, Process Notation, Business Modeling Workflow, Review of Object Orientation, definition of OOA, OOD and OOP

Unit -II

Object Oriented Analysis: Requirements Overview, Problem Statement, Glossary, Use-Case Model, Supplementary Specifications, Analysis and Design Overview Architectural Analysis: Analysis Mechanisms, Key Abstractions, Pattern, Frame, Initial Architectural Layers, Use Case Analysis: finding classes from use case behavior, describe responsibility, attribute and association, qualify analysis mechanism

Unit – III

~~Architectural Design: Design & Implementation Mechanisms, Design Classes & Subsystems, Reuse opportunities Use-Case Design: Interactions between Design Objects, Persistence-Related Behavior, Refine the Flow of Events Description, Unify Classes and Subsystems~~

Unit – IV

~~Subsystem Design: Subsystems and Interfaces, Distribute Subsystem Behavior to Subsystem Elements, Document Subsystem Elements, Subsystem Dependencies Class Design: Create Initial Design Classes, Identify Persistent Classes, Define Operations, Class Visibility, Methods, States, Attributes, Dependencies, Associations, Generalizations, Resolve Use-Case Collisions~~

Unit – V

~~Concurrency and Distribution Overview, UML, case study of OOAD application~~

Books Recommended:

- [1] Grady Booch, Object Oriented Analysis & Design with Application, Pearson Education India 2nd Edition.
- [2] Scott W. Ambler, The Object Primer, Cambridge University Press, 2nd Edition.
- [3] Philippe Kruchten, The rational Unified Processes & Introduction Pearson Education India 2nd Edition.
- [4] Grady Booch, Games Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley
- [5] M. Blaha, J. Rumbaugh, Object Oriented Modeling and Design with UML, Pearson Education 2nd Edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER5S5	L	T	P	L	T	P	Total
Engineering Leadership	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The course to develop growth in decision-making, commit to absolute responsibility to deliver on time resourcefulness, ethical actions and integrity, trust and loyalty, work to empower the people, courage face difficult/high-risk actions head-on, vision, realizing the vision design processes and approaches, interpersonal skills, communicating and advocacy.
2. To excel in careers, broaden technical perspectives and acquire new business and leadership skills.
3. To build a quality to achieve vision and mission by working more effectively in teams.
4. To increase awareness of others by interpersonal skills so that contribution would be best in any situation.
5. To turn empathy into impact & uncover the strengths of team members and inspire them to common purpose.

Pre requisites : Basic knowledge about organization & business environment.

COURSE CONTENTS

UNIT-I

Develop Your Leadership Skills

Overview of leadership, essential qualities, generic leadership traits, team maintenance need, towards the functional approach to leadership, role as leader, turning the core leadership functions into skills, developing leader in you, lead at the strategic level, the functions of a strategic leader, the importance of practical wisdom, leadership for desirable change , grow leaders in your organization

UNIT-II

Leadership & Management

Visions, goals and strategies, the creativity thing - change and resistance to change, the proactive – reactive interface, time management, the dynamics of interdependent leadership, delegation

UNIT-III

Corporate Social Responsibility

Corporate governance and society, corporate governance and finance, governance and the board governance, the CEO and leadership

UNIT-IV

Leadership to Entrepreneurship

Meaning, definition of entrepreneurship, role characteristics, IPR

UNIT-V

Leadership Challenges In Business & Personal Financial Planning

Elements of leadership development, personal & corporate financial planning, how financial planning helps leaders.

Case Studies

Learning Outcomes:

After completing the course a student will be able to -

- 1) Experiential Learning to Enhance Knowledge, Skills and Attitudes
- 2) Built on this foundation, five pillars represent the core elements of the curriculum:
- 3) Leadership Capabilities
- 4) Product Development
- 5) Scientific Foundations
- 6) Challenge Project

BOOKS RECOMMENDED:

- [1] IMS Proschool, “**Introduction to Financial Planning**”, Tata McGraw Hill Education.
 - [2] Madhu Sinha, “**Financial Planning: A Ready to Reckoner**”, Tata McGraw - Hill Education
 - [3] Colombo plan staff college for Technician Education, Manila , **Entrepreneurship Development**, Tata McGrawHill
 - [4] N.K. Acharya, **Text book on intellectual Property Rights**, Asha Law House New Delhi,
 - [5] Raymond Morrison , **Maintaining Effective Engineering Leadership** , IET
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER5L3 Software Laboratory	L	T	P	L	T	P	Total
	0	0	1	0	0	1	1
Duration of Practical: 2 Hours							

Objective: To develop the skill set so that the students can develop software application using python on their own

Prerequisite: Programming Concepts.

Unit-1

Features of Python, Setting up path, Working with Python, Basic Syntax, Variable and Data Types, Operator, If, If- else, Nested if-else, For, While, Nested loops Break, Continue Accessing Strings, Basic Operations, Function and Methods.

Unit-2

Introduction of Sqlite, Database connectivity, Accessing tuples , Executing queries, Transactions , Operations Working, Handling error Functions and Methods, Printing on screen Reading data from keyboard, Opening and closing file, Reading and writing files

Unit-3

Graphics and GUI programming-Drawing using Tkinter and python. Networking and Multi-threaded programming –Sockets, Thread and Processes, Chat application.

Unit-4

Class and object. Attributes, Inheritance, Overloading, Overriding, Data hiding Regular expressions, Match function, Search function, Matching VS Searching, Modifiers, Patterns, CGI(Introduction,Architecture, CGI environment variable, GET and POST methods, Cookies, File upload.

Unit-5

Web Frameworks - for developing server-side Web applications in Python, Web Browse Programming - interfacing with existing browsers and browser technologies.

Outcome: After the completion of the course the student will be able to develop projects on their own and will try to relate them with the real life problems and this skill will help them for the development of project in next academic session as well as their analytic and research capability will be enhanced.

Reference Books:

- John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of india
- R. Nageswara Rao, “Core Python Programming”, dreamtech
- Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
- Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley
- Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication
- Luke Sneeringer, “Professional Python”, Wrox
- Hacking Secret Ciphers with Python”, Al Sweigart, URL-
<https://inventwithpython.com/hacking/chapters>

Programming Assignments:

Students are given programming assignments to learn following.

1. How to take input through file/command line/ network.
2. Concept of Python List, Python String, Python Dictionary, Python Tuples and data type conversion.
3. Techniques of function calling, modules like import, from import etc.
4. Basic I/O functions and exception handling in Python.
5. Concept of object oriented programming, built in class attributes, regular expressions for pattern matching.
6. To work with database interfaces (Sqlite).
7. Concept of networking using Python
8. Web development using web framework flask,bootstrap.
9. Use of XML, CSS, HTML, AJAX to understand the concept behind the web browsing.
10. A project to be developed which uses the above concept.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER6C1 Computer Graphics							
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Course Objectives: The goal of this course is to provide an introduction to the theory and practice of computer Graphics.

Prerequisite(s): Programming language: C++/JAVA

COURSE OF CONTENTS

Unit I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

Unit II

Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; **Hard Copy devices:** Printers and Plotters; **Input devices:** Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

Unit III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

Unit IV

Three Dimensions: 3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, Bspline.

Unit V

Shading and Color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

BOOKS RECOMMENDED

- [1] Hearn Donald and Baker M. Pauling, *Computer Graphics*, 2/e, Prentice Hall of India.
- [2] Hearn Donald and Baker M. Pauling, *Computer Graphics with OpenGL*, 3/e, Prentice Hall, 2004.
- [3] David F. Rogers, *Procedural Element of computer Graphics*, McGraw Hill International.
- [4] William M. Newman Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw

Hill.

- [5] J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, *Introduction to ComputerGraphics*, Addison-Wesley, 1994.
- [6] Zhigang Xiang and Roy Plastock, *Computer Graphics*, Tata McGraw Hill Publications.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Computer Engineering)					
Subject Code & Name	Instructions Hours perWeek			Mark					
					TH	C W	SW	PR	TOTAL
2CO252 Computer Graphics	L	T	P	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	4	-	2	Min	35	25	25	25	110

Course Objectives: The goal of this course is to provide an introduction to the theory and practice of computer Graphics.

Prerequisite(s): Programming language: C++/JAVA

COURSE OF CONTENTS

Unit I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

Unit II

Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; **Hard Copy devices:** Printers and Plotters; **Input devices:** Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

Unit III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

Unit IV

Three Dimensions: 3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, B-spline.

Unit V

Shading and color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

BOOKS RECOMMENDED

- [1] Hearn Donald and Baker M.Pauling, *Computer Graphics*, 2/e, Prentice Hall of India.
- [2] Hearn Donald and Baker M.Pauling, *Computer Graphics with OpenGL*, 3/e, Prentice Hall, 2004.
- [3] David F. Rogers, *Procedural Element of computer Graphics*, McGraw Hill International.
- [4] William M. Newman Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw Hill.
- [5] J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, *Introduction to Computer Graphics*, Addison- Wesley, 1994.
- [6] Zhigang Xiang and Roy Plastock, *Computer Graphics*, Tata McGraw Hill Publications.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER6C2	L	T	P	L	T	P	Total
Design and Analysis of Algorithms	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
2. Knowledge of algorithm design strategies
3. Familiarity with an assortment of important algorithms
4. Ability to analyze time and space complexity

Prerequisite:

The students are required to have familiarity with the following data structures: Arrays and linked lists, Stacks and queues, Graphs and trees, binary search trees, height balancing, Heaps and priority queues

COURSE CONTENTS

UNIT-I: Introduction to Algorithms

Notion of algorithms, properties, important areas of research in connection with the study of algorithms, Types of algorithms; Analysis- best case, worst case, and average case. Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

UNIT-II: Selected Algorithms for Sorting, Searching and matrix multiplication

Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements. Divide-and-Conquer strategy, Strassen's matrix multiplication.

UNIT-III: Greedy Method and Dynamic Programming

Algorithms design techniques based on Greedy Method and Dynamic programming. Illustration of these strategies using appropriate examples including Knapsack problem, optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, and Matrix chain multiplication problem.

UNIT-IV: Backtracking, Branch-and- Bound, and String Matching

Backtracking and Branch-and- Bound algorithm design techniques, Illustration of these techniques using appropriate examples like Queens Problem, subset sum problem, traveling salesperson problem, etc. Introduction to string matching problem, Applications, String matching algorithms: Naïve algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc.

UNIT-V: The Theory of NP-Completeness

Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Decision and optimization problems, Tractable and Intractable Problems, Computational Classes: – P, NP, NP-Complete, and NP-Hard; reducibility, Selected NP-Complete and NP-Hard problems: Hamiltonian cycle, Traveling Salesperson (TSP). Satisfiability, Clique

problems, etc.

Learning Outcomes:

Students who have completed this course should be able to:

1. Apply design principles and concepts to algorithm design
2. Have the mathematical foundation in analysis of algorithms
3. Understand different algorithmic design strategies
4. Analyze the efficiency of algorithms using time and space complexity theory

Assessment methods of all of the above: quizzes, exams, assignments, practicals

BOOKS RECOMMENDED:

- [1] Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, *Introduction to Algorithms*, Second Edition, MIT Press/McGraw-Hill, 2001.
- [2] Michael T Goodrich and Roberto Tamassia, *Algorithm Design: Foundations, Analysis, and Internet Examples*, Second Edition, Wiley, 2006.
- [3] Jon Kleinberg and Éva Tardos, *Algorithm Design*, Pearson, 2005.
- [4] E. Horowitz, S. Sahni, S Rajasekaran, *Computer Algorithms*, Galgotia Publications.
- [5] Saara Base, *Computer Algorithms: Introduction to Design and Analysis*, Addison Wesley, 2/e, 1988.
- [6] Knuth, D, *The art of computer programming*, Vols. 1-2-3, Addison Wesley 1968-73.
- [7] A V Aho, J E Hopcroft & J D Ullman, *The Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.
- [8] Vijay V Vazirani, *Approximation Algorithms*, Springer-Verlag, 2001

Scheme for B.E. III (Computer Engineering) effective from June 2008

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Computer Engineering) Semester VI					
Subject Code & Name	Instructions Hours per Week			Marks					
3CO252 Analysis Of Algorithm	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
	Duration of Theory Paper: 3 Hours			Min	35	25	25	25	110

Course Objectives: This course aims to introduce approaches for analyzing algorithms in various domains, and techniques for designing efficient algorithms. Upon completion of this course the student should be able to:

1. apply the algorithms and design techniques to solve problems;
2. have a sense of the complexities of various problems in different domains.

Prerequisite: Knowledge of data structures may assist the learning process.

COURSE OF CONTENTS

Unit-I

Introduction to Algorithms: Design & analysis issues; Types of algorithms; Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

Unit-II

Analysis of Some Sorting and Searching Algorithms: Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements.

Unit-III

Algorithms Design Techniques: Divide-and-Conquer, Greedy Method, Dynamic programming, Backtracking and Branch-and-Bound; Illustration of above strategies using appropriate examples like; Knapsack problem, Optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, Queens problems, Traveling salesperson problem etc.

Unit-IV

Analysis of Matrix and Polynomial Algorithms: ~~Boolean Matrix Multiplication's~~; Strassen's matrix multiplication; Matrix chain multiplication problem; ~~Solving Linear Equations, Computation of polynomials — Horner's method.~~ String matching algorithms.

Unit-V

Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Computational classes: – P, NP, NP- Complete, and NP-Hard; reducibility, Decision and optimization problems, Some NP and NP-Hard problems: Hamiltonion cycle, Traveling Salseperson (TSP). Satisfiability, Clique problems etc.

RECOMMENDED BOOKS

- [1] T.H. Coreman, C.E. Leiserson and R.L. Rivest, *Introduction to Algorithms*, Prentice Hall of India, 1990.
- [2] E. Horowitz, S. Sahni, S Rajasekaran, *Computer Algorithms*, Galgotia Publications.

- [3] Saara Base, *Computer Algorithms: Introduction to Design and Analysis*, Addison Wesley, 2/e, 1988.
- [4] Knuth, D, *The art of computer programming* , Vols. 1-2-3, Addison Wesley 1968-73.
- [5] A V Aho, J E Hopcroft & J D Ullman, *The Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering)(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
CER6C3 Compiler Techniques	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- Provide a framework for understanding the fundamentals of Compiler. To familiarize students with new Compilation Problems.
- Develop skills to understand how to Design a Compiler.
- Develop ability to understand how to enhance performance of a Compiler for newly evolved Programming Languages.

Prerequisites: Knowledge of Computer Programming, Data Structures, Discrete Mathematics.

Knowledge of several different Programming Languages will be useful.

Course Contents

Unit I : Introduction to Compiling

Compilers: The Analysis-Synthesis Model of Compilation, The Context of a Compiler; Analysis

of the Source Program: Lexical Analysis, Syntax Analysis, Semantic Analysis; The Phases of a Compiler: Symbol-Table Management, Error Detection and Reporting, The Analysis Phases, Intermediate Code Generation, Code Optimization, Code Generation; Cousins of the Compiler: System Software, Interpreters, Kinds of Language Processors, Preprocessors, Assemblers, Linkers and Loaders, Macros; The Grouping of Phases: Front and Back Ends, Passes, Reducing the Number of Passes; Compiler Construction Tools.

Unit II: Lexical Analysis

The Role of the Lexical Analyzer: Lexical Analysis Versus Parsing, Tokens, Patterns and Lexemes,

Attributes for Tokens, Lexical Errors; Specification of Tokens: Strings and Languages, Operations

on Languages, Regular Expressions, Regular Definitions; Recognition of Tokens: Transition Diagrams.

Unit III: Syntax Analysis

Introduction: The Role of the Parser, Classification of Grammars, Syntax Error Handling; Context-

Free Grammars: Parse Tree and Derivations, Ambiguity, CFG Versus Regular Expressions;

Writing a Grammar: Lexical Versus Syntactic Analysis, Eliminating Ambiguity, Elimination

of Left Recursion, Left Factoring; Top- Down Parsing: Recursive Descent Parsing, LL(1) Grammars, Nonrecursive Predictive Parsing; Bottom-Up Parsing: Reductions, Shift Reduce Parsing, Conflicts During Shift Reduce Parsing; LR Parsing: Simple LR, Constructing SLR-Parsing Tables, Constructing LALR Parsing Tables; Using Ambiguous Grammars: Precedence and Associativity to Resolve Conflicts, The “Dangling-Else” Ambiguity.

Unit IV: Intermediate-Code Generation and Run-Time Environment

Variants of Syntax Trees: Directed Acyclic Graphs for Expressions, The Value-Number Method for Constructing DAG's; Three Address Code: Addresses and Instructions, Quadruples, Triples; Type Checking: Rules for Type Checking, Type Conversions; Storage Organization: Static Versus Dynamic Storage Allocation; Stack Allocation of Space: Activation Trees, Activation Records; Introduction to Garbage Collection: Design Goals for Garbage Collectors, Reachability.

Unit V: Code Optimization and Planning a Compiler

Basic Blocks and Flow Graphs: Basic Blocks, Flow Graphs, Representation of Flow Graphs; Optimization of Basic Blocks: The DAG Representation of Basic Blocks, Local Common Subexpressions Elimination, Semantic Preserving Transformations, Global Common Subexpressions Eliminations, Dead Code Elimination; Loop Optimization: Loop Invariant Code Motion, Reduction in Strength, Induction Variable Elimination, Loop Unrolling; Planning a Compiler: Source Language Issues, Target Language Issues, Performance Criteria.

Learning Outcomes:

Upon completing the course, students will be able to:

- Acquire advance knowledge and understanding of Compiler. Use skills in Compiler Design.
- Apply acquired knowledge to improve performance of a Compiler.
- In addition to development in technology computer architectures offers a variety of resources of which students will be able to innovate in the Compiler Design.

Books Recommended:

[1] Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.

[2] Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.

[3] System Programming: D M Dhamdhare; McGraw Hill Education.

[4] System Programming and Operating Systems: D M Dhamdhare; McGraw Hill Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Computer Engineering					
Subject Code & Name 4CO256 Compiler Construction	Periods Hours/ Week	Marks	TH	CW	SW	Pr	Total
Duration of Theory Paper: 3 Hours	Lectures- 4	Max	100	50	-		150
	Tutorials-0	Min	35	25			060
	Practical- 0						

Course of Contents

Objective: To familiarize with the compiler analysis, implementation of compiler and optimization techniques. To know how to use compiler construction tools, in using the virtual machines such as JVM and java byte-codes.

Unit-I

~~Basic Compiler Functions, Machine-Dependent compiler features, Machine-Independent compiler features, Compiler Design Option.~~

Unit-II

~~Programming language specification: Definition of syntax, Semantics and pragmatics, In-depth study of syntactic specification, Brief description of compiler phases.~~

Unit-III

Symantics and symantic analysis: Static vs. dynamic semantics; Names, scopes and bindings; Object lifetimes; Run-time system organization (the stack, the heap, garbage collection); Classification of semantic objects for an intermediate representation; Symbol tables and their relationship to semantic objects; Symbol table implementation: binary trees vs. hashing; Attribute Grammars.

Unit-IV

Intermediate representation, Code Optimization, Control Flow analysis, Data Flow Analysis, Register Allocation.

Unit-V

~~Case study of SunOS C compiler, Java Compiler and Environment, The YACC Compiler-Compiler.~~

Books :

~~[1] Engineering a compiler, Keith Dekooper & Linda Torazon.~~

~~[2] Compilers — Principles, Techniques, and Tools; Aho, Sethi, Ullman —~~

~~[3] Intel Corporation, The IA-32 System Developer's Manual (Volumes 2A, 2B, 3A, 3B)~~

~~Agner — Fog, How — to Optimize for the Pentium Processors. —~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering)(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SCR6S6	L	T	P	L	T	P	Total
Professional Development	3	1	0	2	0	0	2
Duration of Theory Paper:3 Hours							

LEARNING OBJECTIVES:

Students who successfully complete this course will:

- Become aware of local business practices world wide
- Understand and evaluate the issues that impact their learning communities
- Gain new perspectives on their aspired professional areas
- Become aware of culturally-specific business practices, perspectives on work ethic, constructive interactions, and related issues
- Become aware about the job Market and their growth

PRE REQUISITES: Basic Knowledge about organization, business environment & computer, Internet or smart phone (for social networking sites).

COURSE CONTENTS

Unit 1 Time Management

- Time Management perception
- Time Management & your life
- Set Priorities
- Magic of 168
- S.M.A.R.T.
- Time Management Tools
- Time Management Behavior

Unit 2 Strengthen different Skills - I

- critical thinking skills
- creative problem-solving skills
- critical reflection skills
- Make cognitive connections between learning & other learning experiences
- Strengthen collaborative learning and teamwork skills

Unit 3 Strengthen different Skills- II

- Strengthen academic writing skills
- Strengthen oral presentation skills
- Strengthen critical reflection skills
- Become familiar with resources available for further research on business practices and issues, as well as culturally-specific business behavior

Unit 4 Personality

- Defining Personality,
- Personality Determinants,
- Personality Development,
- Personality Change
- Various types of Personality.
- Motivation and its Process,
- Increase intercultural skills through guided consideration of varied perspectives

Unit 5 Communication Skills

- Strengthen academic writing skills Resume Writing
- Strengthen oral presentation skills Interview , Discuss speech and short memo assignments
- Strengthen critical reflection skills GD
- Listening skills

Unit 6 Leadership

- Types of Leaders and Styles of Leadership,
- Characteristics and Functions of Leadership,
- Values and Ethics of Leadership.
- Theories Of Leadership
- Leader Member Exchange Theory,
- Contingency Theory,
- Path- Goal Leadership Theory
- Transformational Leadership Theory,
- Charismatic Theory.
-

CASE STUDIES

Industry Visit and Training after completion of the course by students with the help of placement cell.

Using social networking sites students have to develop their professional network.

LEARNING OUTCOMES:

The Professional Development course is comprised of two essential elements: a methodological and contextual seminar and a practical industry survey. The methodological and contextual seminar is delivered by faculty that includes readings, lectures, and discussion of local business practices, key issues for organizations associated with the learning communities.

It also includes discussion of the students' areas of professional interests, and culturally-specific training for students' constructive interaction with local industry. Students will visit local organizations as a group and will gain first-hand knowledge of operations and issues. Discussion with industry leaders will complement these visits. Preparatory group discussions prior to field visits and reflective group exercises following visits will enable students to compare and contrast their observations, challenge and confirm their prior thinking, and sharpen their understanding of the issues that impact their learning communities. Other professional events, such as networking events, will augment the course.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering)(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER6E1 Data Warehousing & Mining	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. Ability to understand the role of data mining in knowledge discovery process.
2. To familiarize with various data mining functionalities and how it can be applied to various real-world problems.
3. To learn about finding data characteristics and evaluating the outcome of data mining process.
4. To familiarize with various machine learning algorithms used in data mining.

Prerequisite(s):

The students are required to have some basic knowledge about Data structures and Databases.

COURSE CONTENTS

UNIT-I: Introduction

Data Mining: Overview, Type of data mined, Functionalities, Technology used, Target applications and challenges; Data Features: Attribute types, basic statistical description, measuring data similarity and dissimilarity.

UNIT-II: Data Preprocessing and Data Warehouse

Data Preprocessing: Overview, Data cleaning, Data integration, Data reduction, Data transformation and discretization; Data Warehouse: Basic concepts, Design and Usage, Implementation.

UNIT-III: Frequent Pattern and Association rule Mining

Basic concepts, Pattern Mining: Apriori algorithm, FP-growth Algorithm; Generating association rules, Pattern evaluation methods, Multi-level and multi-dimensional pattern mining.

UNIT-IV: Classification

Introduction, Decision tree induction, Bayes classification, Rule based classification, Advance classification methods: Bayesian belief networks, backpropogation etc.

UNIT-V: Cluster analysis and Advance Topics

Clustering: Introduction, Types of clustering; Partition-based clustering: K-Means, K-Medoids; Density based clustering: DBSCAN, Clustering evaluation.

Web Data Mining: Introduction, Types of Web mining, and Overview of web usage mining, web content mining and web structure mining.

Learning Outcomes:

Students who have completed this course should be able to:

1. Apply data mining functionalities on real world problems and datasets.
2. Have some knowledge about the couple of data mining tools and how they can be used for large data.
3. They would be able to find the characteristics of given data and may identify presence of outliers, if any.
4. The course would help them to pursue some advance course on data science and may help in subjects like Big Data, AI etc.

Assessment methods of all of the above: quizzes, exams, assignments, practicals

Books Recommended:

- [1] Han, Kamber and Pi, Data Mining Concepts & Techniques, Morgan Kaufmann, 3rd Edition, India, 2012.
- [2] Mohammed Zaki and Wagner Meira Jr., Data Mining and Analysis: Fundamental Concepts and Algorithms, Cambridge University Press, 2014.
- [3] Z. Markov, Daniel T. Larose Data Mining the Web, Jhon wiley & son, USA, 2007.
- [4] Bing Liu, Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, Springer, 2nd Edition, 2011.
- [5] Sam Anahory and Dennis Murray, Data Warehousing in the Real World, Pearson Education Asia, 2000.
- [6] W. H. Inmon, Building the Data Warehouse, 4th Ed Wiley India, 2005.

List of Experiments :

R-programming and WEKA tools need to be learn in order to complete the lab assignments.

- To know your data, an experiment to visualize summarized data using box-plot, scatter plot and quantile-quantile plot using R-Programming.
- To clean your data, an experiment to find outliers, remove noise and identify correlated data using R-Programming.

- To implement A-priori algorithm to find the frequent patterns in the given dataset. Students can use programming language of their choice to code.
- Use of WEKA tool to use various association mining algorithms on datasets and evaluate them based on pattern evaluation measures.
- Use of WEKA tool to use various classification algorithms on datasets and evaluate them on the basis of accuracy and other parameters.
- Use of WEKA tool to use various clustering algorithms on datasets and evaluate them based on cluster quality and other parameters.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Computer Engineering)					
Subject Code & Name	Instructions Hours per week			Marks					
4CO207 Very Large Databases	L	T	P		T H	C W	S W	P R	Tota l
Duration of Theory Paper 3 Hours	4	0	2	Ma x	10 0	50	50	50	250
				Min	35	25	25	25	110

Objective: To provide knowledge of data warehouse & data mining tasks & techniques.

Prerequisite: Knowledge of Database Management System.

Course of Contents

UNIT I - Introduction

Introduction to Data warehouse, OLTP, OLAP, Data Mining, Processes within data warehouse, Extraction, Loading, Cleaning, Transformation of data, Data warehouse, Multidimensional Model, Schemas for Multidimensional database, Defining Star, Snowflake and Fact Constellation. Concept Hierarchy.

UNIT II - Architecture

Design & Construction of Data Warehouses, Three- Tier Data Warehouse Architecture, Data Mining Primitives, DMQL. Architecture of Data Mining System.

UNIT III - Data Mining: Associations, Correlations & Cluster Analysis

Data mining techniques, Association rules mining, Apriori Algorithm, cluster analysis, Types of data in clustering analysis, categorization of major clustering methods.

UNIT IV - Classification and Prediction

Issues regarding classification and prediction, Classification by decision tree induction, Bayesian classification, Rule-based classification, Classification by back-propagation, Association Classification, Other classification methods, Prediction.

UNIT V - Advanced Topics

Web Mining, Web concept mining, Web structure mining, Web Usage mining. Spatial Mining, KDD Process.

Books Recommended:

- [1] Han and Kamber, Data Mining Concepts & Techniques, Morgan. Kaufman, India 2001.
- [2] Sam Anahory and Dennis Murray, Data Warehousing in the real World, Pearson Education Asia, 2000.
- [3] W. H. Inmon, Building the Data Warehouse, 4th Ed Wiley dreamtech India, 2005.
- [4] [Z. Markov, Daniel T. Larose](#) Data Mining the Web, Jhon wiley & son, USA, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. Computer Engineering (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER6G4 Wireless and Mobile Networks	L	T	P	L	T	P	Total
	3	1	0	3	1	-	4

Learning Objectives: To understand the basic concepts of wireless communication with focus on mobile networking.

- To provide knowledge of different techniques of wireless communication.
- To learn about integration of services and applications from fixed networks into mobile networks.

Prerequisite: Basic knowledge of Computer Networks.

UNIT-I

Introduction: Wireless Networks, Wireless vs Wired Networks, mobile devices, mobile applications, mobile environments and limitations, Wireless transmission-frequencies and regulation, multipath propagation, channel fading, Multiplexing and Modulation techniques, Spread spectrum-DSSS & FHSS,

UNIT-II

Medium Access Control – motivation for specialized MAC, Hidden/Exposed, Near/Far terminal effect, MAC protocols – SDMA, FDMA, TDMA, Reservation Aloha, PRMA, MACA, DSMA etc.

Cellular networks- overview, Cellular Concept and Frequency Reuse, Channel Allocation, Call Setup, Cell Handoffs, Location Management, CDMA, GSM- Architecture, GSM-Air Interface, protocols, HLR/VLR, localization & calling, security, GPRS.

UNIT-III

Wireless LAN : Infra vs Radio transmission, infrastructure vs ad hoc network, IEEE 802.11- system and protocol architecture, MAC management, IEEE 802.11 flavours, Bluetooth – architecture, radio and basband layer, L2CAP, IEEE 802.15, WiMax and Zigbee overview

UNIT-IV

Mobile Network Layer : Entities, Packet delivery, Agent Discovery, Tunneling and encapsulation, optimization, reverse tunnelling,

Mobile Transport Layer : Congestion control and implication of mobility, slow start, Mobile TCP – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ Fast recovery.
Support for Mobility – File System – CODA, WAP –Architecture,

UNIT-V

Mobile Adhoc Networks- Protocols and Routing,

Advances in Mobile Technologies- 5G and Beyond, Internet of Things (IoT), Internet of Everything (IoE), Wireless Sensor Networks, Mobile Opportunistic Networks

Wireless Network Planning and Administration- Wireless Hardware, Wireless Network Design and Deploy, Troubleshooting hardware and connection issues.

Learning Outcomes:

Upon completing the course, students will:

- Be familiar with wireless communication methodologies
- Learn wireless communication protocols and different standards
- Be able to apply these concepts in Wireless Network planning, design and administration to support mobility.

Suggested Books and resources:

- 1 Jochen Schiller, Mobile Communications, Pearson Education, 2/e, 2003.
- 2 W. Stallings, Wireless Communications & Networks, Pearson Education, 2/e, 2005.
- 3 Dharma P. Agrawal and Qing-An Zeng, Introduction to Wireless and Mobile Systems, Cengage Publication, 2012.
- 4 Wale Soyinka, Wireless Network Administration-A Beginner's Guide, Tata McGraw-Hill Edu, 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Computer Engineering					
Subject Code & Name	Periods Hours/ Week	Marks	TH	CW	SW	Pr	Total
4CO204 Wireless Protocols & Mobile Computing	Lectures- 4 Tutorials-0	Max	100	50	50	50	250
Duration of Theory Paper: 3Hour	Practical- 2	Min	35	25	25	25	110

Objective:To give exposure to the students on wireless communication with emphasis on protocol design and computing on mobile nodes.

Course of Contents

Unit-I

Introduction, Wireless Networks, Wireless VS Wired Networks, Mobile Devices, Mobile Applications, Mobile Environment and limitations, Wireless transmission, Multiplexing, Modulation, Spread spectrum-DSSS & FHSS

Unit-II

Cellular networks-overview, Cellular Concept, Frequency Reuse, Channel Allocation, Call Setup, Cell Handoffs, Location Management, Medium Access Control-motivation for specialized MAC, SDMA,FDMA,TDMA, Reservation Aloha, PRMA, MACA, DSMA, CDMA, GSM-Basics, GSM-Air Interface, protocols, localization & calling

Unit-III

Wireless LANs,802.11 System & Protocol Architecture, ~~MAC layer-DFW~~MAC-DCF with CSMA/CA, CTS/RTS extension & polling, MAC management, Mobile IP, TCP over wireless, TCP and mobility

Unit-IV

~~Designing mobile applications, Mobile agents transcoding and proxy architecture, wireless web and WAP, J2ME basics, Mobile Application development using J2ME, Data broadcasting, and Location-based computing,~~

Unit-V

~~Information management: data dissemination and broadcast models, mobile database and mobile transaction, location-Independent and location-dependent computing models, Human-computer interactions: reduced user interfaces, wearable and pervasive computing; Use of XML & UML in mobile interfaces~~

Books Recommended:

- [1] J Schiller, Mobile Communications, Pearson Education,2003
- [2] W. Stalling, Wireless Communications & Networks, Pearson Education, 2/e,2005
- [3] A Talukdar, RYavagal, Mobile Computing: Technology, Applications &Service Creation, McGrawHill, 2006
- [4] Reza B'Far, Mobile Computing Principles; Designing and Developing Mobile Applications with UML and XML, Cambridge University Press,2005.
- [5] James Keogh, The Complete Reference J2ME, Tata McGraw Hill,2003

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Computer Engineering)(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER6L4 Computer Graphics Lab	L	T	P	L	T	P	Total
Duration of Theory Paper:	0	0	2	0	0	1	1

List of Practical Assignments :

1. Implement following line drawing algorithm & compare it on the basis (mentioned in table given below) and prepare the table.

	Bresenham	DDA
No. of addition or subtraction		
No. of multiplication		
Execution time		

2. Implement following Circle drawing algorithm & compare it on the basis (mentioned in table given below) and prepare the table.

	Bresenham	Mid point algorithm
No. of addition or subtraction		
No. of multiplication		
Execution time		

3. Implement following Character generation algorithm & compare it on the basis (mentioned in table given below) and prepare the table.

	Stroke	Bit Map
Execution time		
Implementation complexity (advantages/disadvantages)		

4. Implement following Polygon filling algorithm & compare it on the basis

	Seed fill	Scan line
Execution time		
Implementation complexity (advantages/disadvantages)		

(mentioned in table given below) and prepare the table.

Implement Cohen Sutherland and Cyrus Back line clipping algorithms and display the clipped portion of line as demonstration.

5. Implement Cohen Houghman polygon clipping algorithm to clip a polygon against a rectangular boundary and combine Cohen Houghman polygon

clipping algorithm with Cyrus Back line clipping algorithms to clip a polygon against another polygon and display the clipped portion of polygon.

6. Implement the following 2D transformation using matrix multiplication.
Translation
Rotation
Scaling
Shearing
Reflection
7. Implement parallel (oblique and axonometric) and perspective projection and display following objects using projections.
Pyramid
Rectangles
8. Implement the following 3D transformation using matrix multiplication. And display using perspective projection.
Translation
Rotation
Scaling
Shearing
Reflection
9. Implement rotation of an object about any arbitrary axis.
10. Implement reflection of an object about any arbitrary plane.
11. Implement the L-system for generation of symmetric objects(Fractals)
12. Generate 2D curve and surfaces using implementation of Bezier curve.
13. Implement the following visible surface detection algorithm and compare them on the basis of complexities and execution time.
Z-buffer
Scan-line
Depth sorting
Octree
RayCasting
14. Implement the following rendering algorithm and compare them on the basis of complexities and execution time.
Flat Shading
Gouraud shading
Phong shading
Ray tracing

Academic Year: July-2018 to June-2019
 Programme: B.E. IV
 Branch: Computer Engineering

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	4CO257	Distributed Computing	CER7C1	Distributed Computing	0%
2	4CO255	Cloud Computing(Elective - II)	CER7C2	Cloud Computing	0%
3	4CO202	Artificial Intelligence	CER7C3	Artificial Intelligence	10%
4	4CO205	Machine Learning(Elective - I)	CER7E1	Machine Learning	15%
5			CER7E2	Optimization Algorithms & Techniques	100%
6	4CO259	Robotics & Numerical Control	CER7E3	Robotics and Numerical Control	0%
7			CER7E4	Computer Vision	100%
8	4CO208	VLSI Design	CER7E5	VLSI Design	0%
9	4CO258	Information Retrieval & Extraction	CER8C1	Information Retrieval & Extraction	5%
10	4CO253	Network & Information Security	CER8C2	Network & Information Security	0%
11			CER8C3	Data Sciences	100%
12			CER8E1	Soft Computing	100%
13			CER8E2	Deep Learning	100%
14			CER8E3	Game AI	100%
15	4CO206	Parallel Computing	CER8E4	Parallel Computing	0%
16			CER8E5	Human Computer Interaction	100%
17	4CO204	Wireless Protocols & Mobile Computing			
18	4EI251	Control System Theory			
19	4CO254	Internet Computing			
20	4CO252	Enterprise Resource Planning			
21	4CO209	Embedded Systems			
22	4CO256	Compiler Construction			
23	4CO207	Very Large Databases			
Average % change in BE program = Total average / 4 =					11.50%
Average % change =					46%

Sem-7
 Sem-8

S.V. Patil
 5.12.18
 S.V. Patil
 5/12
 S.V. Patil
 5/12
 S.V. Patil
 5/12

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IVYear B.E. (Computer Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER7C1 Distributed Computing	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Basic Concept-Concepts of Distributed Systems : Introduction, Distributed computing models, Software concepts, Design issues in distributed systems, Client-server model, WWW 1.0 and 2.0. Network Communication: LAN and WAN technologies, OSI Model and Internet protocols, ATM, Protocols for Distributed systems

Unit-II

Distributed Computing System DCS design goals, Transparencies, Fundamental issues, Distributed Coordination, Inter-process Communication: Message Passing and its features, IPC message format, IPC synchronization, Buffering, multi datagram messaging, process addressing techniques, failure handling, Formal Models for message passing systems, Broadcast and converge cast on a spanning tree, Flooding and building a spanning tree, Constructing a DFS spanning tree with and without a specified root

Unit-III

Remote Communication: Introduction, RPC basics, RPC implementation, RPC Communication, Other issues, Sun RPC, RMI basics, RMI Implementation, Java RMI

Unit-IV

Synchronization: Clock synchronization, Logical clocks, Global state, Mutual exclusion,

Election algorithms: Bully algorithm, Ring algorithm, Leader election in rings, anonymous rings, Asynchronous rings, synchronous rings, election in wireless networks

Unit-V

Deadlock: Deadlocks in distributed systems, Deadlock in Message communication, Distributed Shared Memory: Concepts, Hardware DSM, Design issues in DSM systems, Implementation issues, Heterogeneous and other DSM systems, Naming: Overview, Features, Basic concepts, System oriented names, Object locating mechanisms, Issues in designing human oriented names, Name caches, Naming and security, DNS

Distributed database system: A Case study

RECOMMENDED BOOKS

1. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University Press
2. Distributed Systems: Principles and Paradigms, Taunenbaum
3. Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg, Pearson Education
4. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, Hagit Attiya and Jennifer Welch, Wiley India

Learning Outcomes:

After learning the course the students should be able to

1. Understand distributed systems
2. Know various types of transparencies which Distributed OS should provide
3. Understand and analyze Message passing models
4. Understand RPC and implement it using manual or automatic stub generation
5. Know various synchronization issues
6. Know, analyze various election algorithms
7. Implement threads Understand distributed systems
8. Know various types of transparencies which Distributed OS should provide
9. Understand and analysis Message passing models
10. Understand RPC and implement it using manual or automatic stub generation
11. Know various synchronization issues
12. Know, analyze various election algorithms
13. Implement threads
14. Know File systems
15. Compare various Distributed OS

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE IV Year Computer Engineering (Semester – A)				
Subject Code : CER7C2	Instructions Hours per Week			Credits			
Subject Name: Cloud Computing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours							

Course Objective:

To study the latest Computing Technologies of Computer Engineering.

Cloud Computing

Unit-I: Introduction to Cloud Computing

Cloud computing introduction and overview, history, characteristics of cloud, service and deployment models, Role of virtualization in enabling the cloud, Applications, providers of IaaS, PaaS and SaaS; challenges, advantages and disadvantages, Issues, SOA Programming model, Cloud based OS, deployment tools, cloud as green computing model.

Unit –II: Virtualization

Introduction to virtualization, characteristics, virtualization at infrastructure level, CPU virtualization, storage virtualization, network virtualization, Hypervisors, SAN, VLAN, Server virtualization, data center challenges and solutions, scaling a cloud infrastructure.

Unit-III : Service management in cloud

Service monitoring, load balancing, database recovery, backup management, virtual machine management, SLA. Migration of virtual Machines and techniques, different types of management issues.

Unit-IV: Issues and challenges in cloud

Various issues in cloud, cloud security services, secure cloud software requirements, cloud security challenges, network security, virtual machine security, threads.

Unit-V: Using mobile cloud

Working with mobile devices, cloud services applied in smartphone, mobile web services, performance synchronization, Defining WAP & other protocols, Fog computing.
Case study: google app engine, amazon open stack, Aneka, Microsoft Azure.

Recommended Books:

- 1) *Rajkumar Buyya; Cloud Computing Principles and Paradigms; John Wiley & Sons 2011.*
- 2) *Rajkumar Buyya; Mastering Cloud Computing; Elsevier Inc 2013.*
- 3) *Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010*
- 4) *Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach” McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.*

IIT NPTEL links:

- https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIzy1cbwIMvGF1EsV4ZtAe8vA_7I (Prof S K Ghosh)
- <https://www.youtube.com/watch?v=NzZXz3fJf6o&list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J>

List of practical's

1. Implementation of virtualization using VMware or VirtualBox.
2. Configuration of virtual machine for Storage unit, NIC, Processors and Memory.
3. Configuration of Hardware and software services of virtual machine
4. Configure IaaS, PaaS and SaaS for users.
5. Add new cloud services for local machine.
6. Design and deploy new web services for cloud users.
7. Manage user account and services in cloud.
8. Manage cloud database for remote users.
9. For the cloud users: Create, Update, delete, and modify the database for services.
10. Develop new services for cloud automation like: service update, upload data, backup.
11. Configure and manage the cloud for automatic data recovery and backup.
12. Working With Goggles APP engine and Amazon AWS services.
13. Identify and analyze the principal issues in troubleshooting virtual environments.
14. Performance evaluations and critical evaluations of a small scale virtual environment.
15. Case Study: PaaS (Face book, Google App Engine), SaaS (Desktop Apps) .
16. Case Study: NoSQL databases, MapReduce.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Computer Engineering					
Subject Code & Name 4CO255 Cloud Computing	Periods Hours/ Week Lectures- 4	Marks	TH	CW	SW	Pr	Total
Duration of Theory Paper: 3Hours	Tutorials-0 Practical- 0	Max	100	50	-	-	150
		Min	35	25	-	-	60

Objective: To Introduce the cutting edge technology in Internet Computing Technology.

Prerequisite: Fundamentals of Network Technology, Fundamentals of Internet Technology.

Course of Content

Unit-I Introduction to Cloud Computing

Cloud introduction and overview, Cloud Computing Technology, Hardware & software Infrastructure, Different clouds, Risks, Cloud Services, Applications, Regulatory Issues, and Limitations.

Unit-II Cloud Computing Architecture

Requirements, Introduction Cloud computing architecture, various kind of Cloud computing architecture, Grid Computing, Transactional Computing ,On Demand Computing, Distributed Computing.

Unit-III Virtualization

Virtualization at the infrastructure level, CPU Virtualization, Storage Virtualization, Network Virtualization, A discussion on Hypervisors, SAN, ISCSI, VLAN. Scaling a Cloud Infrastructure.

Unit-IV Security

Security issues in cloud computing, Data Security: Data Control, Encryption, Regulatory and Standard Compliance, Network security: Firewall Rules, Network Intrusion Detection, Host Security aspects:

Unit-V Disaster Management

Disaster Recovery Planning: Recovery Point Objectives, Recovery Time Objectives, Disaster management in cloud: Backup management Geographic redundancy, Disaster Management: Monitoring, Load Balancing, Database Recovery.

Books and References:

- [1] Cloud Application Architectures. George Reese. Publication O'Reilly, 2009
- [2] Cloud Computing: A Practical Approach. Anthony T. Velte, Tobe J. Velte, Robert Elsenpeter. Publication Pearson Education., 2009

[3] White Papers on cloudComputing

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER7C3	L	T	P	L	T	P	Total
Artificial Intelligence	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Learn the knowledge representation techniques, reasoning techniques and planning
- Introduce the concepts of Expert Systems and machine learning.

Pre requisites: Data Structures and Algorithms

COURSE CONTENTS

UNIT-I

Introduction: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics Problem solving methods – Defining the problem as state space search, Problem graphs, Matching, Indexing and Heuristic functions.

UNIT-II

Search Techniques: Hill Climbing-Depth first and Breadth first, heuristic search strategies- Best-first search, A*, AO* search, Constraints satisfaction, Means end analysis, simulated annealing, etc. Measure of performance and analysis of search algorithms. Adversarial search –Minimax search procedure, alpha-beta pruning, iterative deepening, genetic algorithms - Related algorithms, etc.

UNIT-III

Representation of Knowledge : Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge. Knowledge representation -Production based system, Frame based system, Scripts, CD, Ontologies, Semantic web and RDF.

UNIT-IV

Knowledge Inference and Planning: Inference – Backward chaining, forward chaining, Rule value approach, uncertain knowledge and reasoning: Probabilistic reasoning, Bayesian networks, Fuzzy logic and reasoning, Theory-Bayesian Network-Dempster - Shafer theory.

Planning overview, components of planning system, Goal stack planning, Hierarchical planning, and other planning techniques.

UNIT-V

Machine Learning and Expert Systems: Overview of different forms of learning, Statistical methods, Learning Decision Trees, Neural Networks, Clustering- basic agglomerative, divisive algorithm based on similarity/dissimilarity measures. Introduction to Natural Language Processing.

Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge. Typical expert systems - MYCIN, DART, XCON, Expert systems shells. Basic knowledge of Prolog programming language.

Learning Outcomes:

Upon completing the course, students will be able to:

- Familiar with Artificial Intelligence, its foundation and principles.
- Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications.
- Learn Prolog Programming to program intelligent systems.

BOOKS RECOMMENDED:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill-2008.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007 Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
3. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).
4. <http://nptel.ac.in>.
5. Carl Townsend, “Introduction to Turbo PROLOG”, BPB Publication.
6. Ivan Bratko, “Prolog Programming for Artificial Intelligence”, 3rd Edition, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Computer Engineering					
Subject Code & Name 4CO202 Artificial Intelligence	Periods Hours/ Week	Marks	Th	CW	SW	Pr	Total
		Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	Lectures- 4Tutorials-0 Practical-2	Min	35	25	25	25	110

Objective: To introduce the concepts of making computer systems intelligent through computational methods and techniques.

Course of Contents

Unit-I

AI and AI Techniques; Problems, Problem space and State space; Production systems; Search techniques and algorithms.

Unit-II

Knowledge Representation- Issues and Methods; Predicate logic- resolution and unification; ~~Forward and backward Reasoning~~; Logic programming & Prolog.

Unit-III

Symbolic computation- Uncertainty; ~~Rule based systems~~; ~~Statistical Reasoning~~; Fuzzy Logic; Expert systems; ~~Decision support systems~~.

Unit-IV

~~Semantic networks~~; Frames and Scripts; ~~Conceptual Dependency~~; Game playing; Planning overview; Understanding; Learning.

Unit-V

Natural language processing- parsing, semantic analysis, ~~ATN and RTNs~~; Connectionist models- neural networks; ~~Speech and vision processing~~; ~~Robotic actions~~.

Books Recommended:

- [1] E Rich, K Knight, Artificial Intelligence, 2/e, McGraw Hill, 1991.
- [2] S Russell, P Norvig, Artificial Intelligence: A Modern Approach, 2/e, Pearson Education (PH), 2003.
- [3] D W Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 2007.
- [4] P Winston, Artificial Intelligence, 3/e, Addison Wesley, 1992.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Computer Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER7E1 Machine Learning	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: Classification and Regression learning methods, Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.

Unit-III

Unsupervised Learning: Introduction to unsupervised learning -Clustering -Classification of clustering algorithms, Computational Learning theory, PAC Learning, VC dimension.

Artificial Neural Networks Learning: Neural Network Representation, Perceptron, Backpropagation algorithm.

Unit-IV

Language Learning: Classification problems in language: word-sense disambiguation, Formal Language learning, introduction to Hidden Markov models (HMM's).

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators..

Unit-V

Genetic Algorithms (GAs): Motivation, Representing Hypotheses, Genetic operators, fitness Function and Selection, Working of Genetic Algorithm, Evolutionary Programming and Genetic Programming, **Case studies of Machine Learning data sets .**

RECOMMENDED BOOKS

- [1] Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- [2] Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- [3] Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- [4] David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

- **Problem based on different machine Learning algorithm**
- **Works on different machine learning Tools**
- **Case Study on different data sets**

Devi Ahilya University, Indore, India				BE IV Year Computer Engineering					
Institute of Engineering & Technology									
Subject Code & Name	Instructions Hours per Week			Marks					
4CO205 Machine Learning	L	T	P		TH	CW	SW	PR	Total
	4	0	0	Max	100	50	-	-	150
Duration of Theory Paper:				Min	35	25	-	-	60
3 Hours									

Course Objectives: The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Prerequisite: Basic knowledge of a programming language is required. Basic knowledge of probabilities and statistics is required

COURSE OF CONTENTS

Unit-I

Introduction: Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation.

Inductive Classification: The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. Version spaces and the candidate elimination algorithm.

Unit-II

Decision Tree Learning: Representing concepts as decision trees. Recursive induction of decision trees. Picking the best splitting attribute: entropy and information gain. Searching for simple trees and computational complexity.

~~**Experimental Evaluation of Learning Algorithms:** Measuring the accuracy of learned hypotheses. Comparing learning algorithms: cross-validation, learning curves, and statistical hypothesis testing.~~

Unit-III

~~**Computational Learning Theory:** Models of learnability: learning in the limit; probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training. Sample complexity for finite hypothesis spaces. PAC results for learning conjunctions, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension.~~

Unit-IV

Language Learning: Classification problems in language: word-sense disambiguation, sequence labeling. Formal Language learning, introduction to Hidden Markov models (HMM's).

Support Vector Machines: Maximum margin linear separators. Quadratic programming solution to finding maximum margin separators. Kernels for learning non-linear functions.

Unit-V

Genetic Algorithms (GAs): Motivation, Representing Hypotheses, Genetic operators, fitness Function and Selection. How do GAs work? Machine Learning: The Michigan Approach, The Pitt Approach, An evolution program: the GIL system. Evolutionary Programming and Genetic Programming.

RECOMMENDED BOOKS

- [6] Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- [7] Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- [8] Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- [9] David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- [10] Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Computer Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER7C1 Information Retrieval & Extraction	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To understand challenges, scale and approaches for Information Retrieval system.
- To study structure and components of Information Retrieval systems.
- To understand design of Information Retrieval system by study of different data structures and algorithms used in design..
- To study means of measuring performance and effectiveness of Information Retrieval system and techniques for improvement.
- To understand Information Extraction and inherent challenges.

Pre-requisites: Understanding of Data Structures and Algorithms.

COURSE CONTENTS

UNIT-I

Introduction:Goals and history of IR. The impact of the web on IR., Boolean retrieval: Processing Boolean queries, The extended Boolean model versus ranked retrieval, The term vocabulary & postings lists: Document delineation and character sequence decoding, Determining the vocabulary of terms, Positional postings and phrase queries.

UNIT-II

Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, Spelling correction, Phonetic correction, Index Construction: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Index compression: Statistical properties of terms in information retrieval, Dictionary compression, Postings file compression.

UNIT-III

Scoring, term weighting & the vector space model: Parametric and zone indexes, Term frequency and weighting, The vector space model for scoring, Variant tf-idf functions. Computing scores in a complete search system: Efficient scoring and ranking, Components of an information retrieval system, Vector space scoring and query operator interaction.

UNIT-IV

Evaluation in information retrieval: Information retrieval system evaluation, Standard test collections, Evaluation of unranked retrieval sets, Evaluation of ranked retrieval results, Assessing relevance, Results snippets, Relevance feedback and query expansion, XML retrieval.

UNIT-V

Information Extraction and Other Issues: Language models for information retrieval, Flat clustering, Hierarchical clustering, Web search basics, Web crawling, Information extraction: Task and evaluation.

Learning Outcomes:

Upon completing the course, students will be able to:

- have clear understanding of design of Information Retrieval system.
- Design and code components of Information Retrieval system.
- Understand evaluation of performance and effectiveness of Information Retrieval System.
- Have understanding of working of Web Search system.
- Understand Information Extraction task.

BOOKS RECOMMENDED:

[1] Christopher D. Manning, Prabhakar Raghavan and Hinrich Schutze, *Introduction to Information Retrieval*, Cambridge University Press Cambridge, 2014.

[2] Bruce Croft, Donald Metzler and Trevor Strohman, *Search Engines: Information Retrieval in Practice*. Addison Wesley, 2009.

Devi Ahilya University, Indore, India		BE IV Year Computer					
Institute of Engineering & Technology		Engineering/Information Technology					
Subject Code & Name	Periods Hours/Week	Marks	Th	CW	SW	Pr	Total
4CO258 Information Retrieval & Extraction	Lectures- 4	Max	100	50	00	00	150
Duration of Theory Paper:	Tutorials-0	Min	35	25	00	00	60
3 Hours	Practical- 0						

Course Objectives: The course is aimed to characterize information retrieval in terms of the data, problems and concepts involved. And also covers basics of information extraction.

Course of Contents

Unit 1: Introduction: Goals and history of IR. The impact of the web on IR., Boolean retrieval: Processing Boolean queries, The extended Boolean model versus ranked retrieval, The term vocabulary & postings lists: Document delineation and character sequence decoding, Determining the vocabulary of terms, Positional postings and phrase queries.

Unit 2: Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, Spelling correction, Phonetic correction, Index Construction: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, Index compression: Statistical properties of terms in information retrieval, Dictionary compression, Postings file compression.

Unit 3: Scoring, term weighting & the vector space model: Parametric and zone indexes, Term frequency and weighting, The vector space model for scoring, Variant tf-idf functions. Computing scores in a complete search system: Efficient scoring and ranking, Components of an information retrieval system, Vector space scoring and query operator interaction.

Unit 4: Evaluation in information retrieval: Information retrieval system evaluation, Standard test collections, Evaluation of unranked retrieval sets, Evaluation of ranked retrieval results, Assessing relevance, Results snippets, Relevance feedback and query expansion, XML retrieval.

Unit 5: Language models for information retrieval, Flat clustering, Hierarchical clustering, Web search basics, Web crawling, Information extraction: Task and evaluation.

Books recommended:

[1] Christopher D. Manning , An Introduction to Information Retrieval, Cambridge University Press Cambridge, England.

[2] B. Croft, D. Metzler, and T. Strohan, *Search Engines: Information Retrieval in Practice*. Addison Wesley, February 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER8C2 Network & Information Security	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To impart the knowledge and in-depth reference to current information and network security standards and procedures.
2. This course provides you with an overview of data and computer security and concentrates in technical and continuity management issues.
3. Allow the student to gain expertise in some specific areas of information security such as the design and providing security to individual networks.

Prerequisites :

Basic knowledge of programming and Computer Networks

COURSE CONTENTS

Unit I

Introduction: The need for security, security approaches, principles of security services, mechanisms and attacks, a model for network security. substitution & transposition techniques, steganography, key range & key size.

Unit II

Symmetric Cipher: An general idea of symmetric key cryptography, classical symmetric ciphers, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

Unit III

Asymmetric Cipher: RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

Unit IV

Information Security Protocols: Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3- D Secure Protocol, Email Security, and Kerberos.

Unit V

Network Security: Deffie-Hellman key exchange, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing. Introduction to blockchain technology and cryptocurrency.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Acquire a practical overview of the issues involved in the field of information security.
2. Demonstrate a basic understanding of the practice of IS, especially in the evaluation of information security risks across diverse settings including the Internet and WWW-based commerce systems, high bandwidth digital communications and funds transfer services.
3. The learning outcome is students shall be able to understand what are the common threats faced today, what are the foundational theory behind information security, what are the basic principles and techniques when designing a secure system, how to think adversarial, how today's attacks and defenses work in practice, how to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.
4. Familiarity with the basic protocols of Information Security, and how they can be used to assist in network security design and implementation.

Books Recommended:

1. Douglas R. Stinson; Cryptography Theory and Practice; 2nd Edition, Chapman & Hall/CRC
2. Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education
3. Bernard Menezes; Network Security and Cryptography; Cengage Learning India Pvt Ltd.
4. Neal Krawetz; Introduction to Network Security; 2nd Edition, Thomson Learning Inc.

List of Practical Assignments:

During learning, of course, students need to do assignments:

1. Implementation of various symmetric key algorithms.
2. Implementation of various asymmetric key algorithms.
3. Implementation of Algorithm types and modes (Electronic Code Book (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB)).
4. Study of Pretty Good Privacy open source security tool for email security.
5. Implementation of digital certificates.
6. Study of IP Tables.
7. Implementation of various open source security tools (Wireshark, Nmap, tables, pretty good privacy, Snort, LC5, OpenVPN, TrueCrypt, THC Hydra).

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Computer Engineering					
Subject Code & Name 4CO253 Network & Information Security	Periods Hours/ Week Lectures- 4 Tutorials-0 Practical- 2	Marks	Th	CW	SW	Pr	Total
		Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours		Min	35	25	25	25	110

Objective: To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

Pre-requisite: NIL

Course of Contents

UNIT-I

The need for security, security approaches, principles of security, services, mechanisms & attacks, model for network security. Plain & Cipher text, substitution & transposition techniques, ~~play fair cipher, hill cipher~~, stenography, key range & key size,

UNIT-II

Diffie-Hellman key exchange. An overview of symmetric key cryptography, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

UNIT-III

Brief history & overview of asymmetric key cryptography, RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

UNIT-IV

Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3-D Secure Protocol, Email Security, Kerberos.

UNIT-V

Introduction, ~~brief introduction to TCP/IP~~, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing.

Books Recommended:

- [1] Douglas R. Stinson; *Cryptography Theory and Practice*; 2nd Edition, Chapman & Hall/CRC.
- [2] Williams Stallings; *Cryptography & Network Security*; 3rd Edition, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IVYear B.E. (Computer Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
CER8C3 Data Sciences	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- This course will introduce students to data science basic principles and tools as well as its general mindset.
- Students will learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication.

Prerequisites: Basic knowledge of algorithms and sufficient programming experience and familiarity with basic linear algebra, probability and statistics.

COURSE OF CONTENTS

Unit 1 : Introduction to Data Management

What is Data Science?, Data Science Languages, Data Warehousing & OLAP, Data Preparation, Data Wrangling etc.

Unit 2 : Statistics and EDA

Descriptive Statistics, Inferential Statistics, Exploratory Data Analysis, Hypothesis Testing etc.

Unit 3 : Machine Learning

Linear Regression, Supervised Classification – K-Nearest Neighbors, Clustering – K-Means etc., Decision Trees, Support Vector Machine and Neural Networks etc.

Unit 4 : Big Data Analytics

Introduction to Big Data and Hadoop, Managing Big Data, Introduction to SPARK, Big Data Analysis etc.

Unit 5 : Advance Topics

Mining Social Network graphs; Privacy, Security and Ethical Issues in Data Science; Data Visualization; Recommended Systems etc.

RECOMMENDED BOOKS

- [1] Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.
- [2] Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011.

- [3] Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. ISBN 0387952845. 2009.
- [4] Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013.
- [5] Allen Downey. Think Python. O'Reilly. First Edition. ISBN 144933072X. 2012.
- [6] Joel Grus. Data Science from Scratch. Shroff. ISBN 9352130960. 2015.

Learning Outcomes:

At the conclusion of the course, students should be able to:

- Describe what Data Science is and the skill sets needed to be a data scientist.
- Use Python to carry out basic statistical modeling and analysis.
- Apply EDA and the Data Science process in a case study.
- Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), K-Means) for predictive modeling.
- Create effective visualization of given data, reason around ethical and privacy issues in data science conduct and apply ethical practices.

Devi Ahilya University, Indore, India			IV Year B.E. (Computer Engineering)				
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
CER7E1 Soft Computing	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To familiarize with neural networks and learning methods for neural networks.
2. To introduce basics of genetic algorithms and their applications in optimization and planning.
3. To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
4. To develop skills thorough understanding of the theoretical and practical aspects of Soft Computing.

Pre requisites: Analysis of Algorithm, Artificial Intelligence.

COURSE CONTENTS

UNIT-I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing ,Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

UNIT-II

NEURAL NETWORKS

Backpropagation Networks, Architecture: perceptron model, single layer artificial neural network, multilayer perception model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

UNIT-III

GENETIC ALGORITHMS

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems. Simulated annealing

and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

UNIT-IV FUZZY

LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfication&Defuzzificataions, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-V

NEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification , Neuro Fu zzy Control , Case studies.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply neural networks to pattern classification and regression problems
3. Recognize the feasibility of applying a soft computing methodology for a particular problem
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problems.

BOOKS RECOMMENDED:

[1] S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.

[2] Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.

[3] Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence- Bart Kosko, Prentice Hall, 1992.

[4] Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.

[5] David E. Goldberg, “Genetic Algorithms in search, Optimization & Machine Learning” ,Addison-Wesley, 1997.

Academic Year: July-2016 to June-2017

Programme: B.E. II (FT)

Branch : Electronics & Instrumentation Engg.

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	2EI301	APPLIED MATHEMATICS-III	AER3C1	APPLIED MATHEMATICS-III	40%
2	2EI302	DIGITAL ELECTRONICS	EIR3C2	DIGITAL ELECTRONICS	10%
3			EIR3C3	DATA STRUCTURE	10%
4	2EI304	CIRCUIT ANALYSIS & SYNTHESIS	EIR3C4	NETWORK ANALYSIS	20%
5	2EI305	MICROELECTRONICS	EIR3G1	ELECT. DEVICES AND FAB.	100%
6	2SS007	EFFECTIVE COMMUNICATION SKILL	SIR3S3	EFFECTIVE COMMUNICATION SKILL	5%
7	2EI353	MICROPROCESSORS & ASSEMB. LANG.PROG			
8	2CO352	DIGITAL COMPUTER ORGANIZATION	EIR4C1	COMPUTER ORGANIZATION & ARCHITECTURE	70%
9	2EI303	ELECTRICAL & ELECTRONIC MEASUREMENT	EIR4C2	ELECTRICAL & ELECTRONIC MEASUREMENT	10%
10			EIR4G2	SIGNALS AND SYSTEM	100%
11	3EI303	ANALOG ELECTRONICS	EIR4C3	ANALOG ELECTRONICS	10%
12	2EI354	SENSORS & TRANSDUCERS	EIR4C4	SENSORS AND TRANSDUCERS	5%
13	2SS057	ENGINEERING . ECONOMICS	SIR4S4	ENGINEERING . ECONOMICS	10%
14	2CO355	DATA STRUCTURES			
15	2EI351	APPLIED MATHEMATICS-IV			
				Average % change =	33%
				Average % change in BE program = Total average / 4 =	8.25%

S.v. Zabeer 5/2-18
Shaw
Hingor
Bansal
Bansal
Mishra
5/12
Kumar

Academic Year: July-2017 to June-2018

Programme: B.E. III

Branch : Electronics and Instrumentation Engg.

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	3EI353	OBJECT OREINTED SYSTEM	EIR5C1	OBJECT ORIENTED PROGRAM AND DIGITAL COMMUNICATION	20%
2	3EI302	ANALOG AND DIGITAL COMMUNICATION	EIR5C2	POWER ELECTRONICS	5%
3	4EI352	POWER ELECTRONICS	EIR5C3	MICROCONTROLLERS (AVR)	10%
4	3EI304	MICROCONTROLLERS(8051)	EIR5E1	DIGITAL SIGNAL PROCESSING	100%
5	3EI354	DIGITAL SIGNAL PROCESSING	EIR5G3	PRINCIPLES OF MANAGEMENT	10%
6	3SS306	PRINCIPLES OF MANAGEMENT	SER5S5	ANALOG ELECTRONICS	5%
7	3EI303	ANALOG ELECTRONICS			
8			EIR6C1	VLSI DESIGN	100%
9			EIR6C2	MEDICAL AND ANALYTICAL INSTRUMENTS	100%
10	3EI355	CONTROL SYSTEMS	EIR6C3	CONTROL SYSTEMS	5%
11	3EI305	LINEAR DEVICES & APPLICATIONS	EIR6E1	LINEAR INTEROGATED CIRCUITS	20%
12	3EI301	COMPUTER NETWORKS	EIR6G4	COMPUTER NETWORK	5%
13	3SS357	ENTERPRENEURSHIP DEVELOPMENT AND	SER6S6	ENTERPRENEURSHIP AND IPR	5%
14	3EI352	SOFT COMPUTING TECHNIQUES			
Average % change =					32%
Average % change in BE program = Total average / 4 =					8.00%

S.v. zokelkar
 5.12.18
Chauri
Hingor
Shir
Indle
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Navin
5/12
Bansode
Sumit

Academic Year: July-2018 to June-2019

Programme: B.E. IV

Branch : Electronics and Instrumentation Engg.

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1			EIR7C2	OPERATING SYSTEM	100%
2			EIR7C3	INTELLIGENT	100%
3	4E1304	PROCESS INSTRUMENTATION	EIR7C4	PROCESS INSTRUMENTATION	10%
4	4E1351	CIRCUIT DESIGN USING HDL	EIR7E1	CIRCUIT DESIGN USING HDL	20%
5	4E1302	SAMPLE DATA AND NON LINEAR CONTROL			
6	4E1303	BIOMEDICAL INSTRUMENTATION			
7	4E1305	INDUSTRIAL AUTOMATION			
8	4E1354	ANALYTICAL INSTRUMENTATION			
9	4E1352	POWER ELECTRONICS			
10	4E1353	IC DESIGN & TECHNIQUES			
Average % change =					58%
Average % change in BE program = Total average / 4 =					14.50%

SEM-7

S.V. Zaccaro
 5-12-18

Apin...

STC

Julie
 5/12

Alvin
 5/12

Chen

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Ransae

Crano

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
AER3C1 APPLIED MATHEMATICS-III	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like electromagnetic and electrostatic field theory, control theory, communication and signal processing, power transmission, design of discrete-(time) systems, circuit analysis etc.
2. Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Prerequisites:

Basic knowledge of algebra of complex numbers, determinants, matrices, differentiation and integration of functions and probability theory.

COURSE CONTENTS

Unit-I

Function of Complex variables: Analytic functions, Cauchy's integral theorem and integral formulae, Taylor's and Laurent' series, Residue theorem, Solution of integrals.

Unit-II

Random variables, density function, stochastic process, autocorrelation, Markov chain, Multi-step in Markov chain. Basic concepts of reliability, failure laws, components in series and in parallel, Redundancy.

Unit-III

Interpolation: Finite difference operators, Newton's and Stirling's interpolation, Numerical differentiation, Numerical integration using Trapezoidal, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ and Weddle's rule.

Unit-IV

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-Falsi method, Newton-Raphson method. Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.

Numerical Solutions of differential equations - single and multi-step methods.

Unit-V

Fourier series, sine and cosine series, change of intervals, continuous-time and discrete-time Fourier series, Fourier Integral.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Apply the concept of complex analysis, Fourier analysis and stochastic process in various subjects of engineering like electromagnetic and electrostatic field theory, control theory, signal processing, power transmission and so on.
2. Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.

BOOKS RECOMMENDED:

- [1]. B.S. Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
 - [2]. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
 - [3]. Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
 - [4]. Kasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
 - [5]. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw - Hill Education, 2002.
 - [6]. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, John Wiley & Sons, 2006.
 - [7]. G. Paria, Statistics and Stochastic Processes Part II, Scholar's Publication, Indore.
 - [8]. A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
 - [9]. Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2AM301 Applied Mathematics- III		L	T	P		TH	CW	S W	P R	Tota l
		4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours					Min	35	25	-	-	60

Course Objectives: The course aims at making the students familiar about some Special Functions, useful in particle physics, Spectral and Pseudo spectral approximations, Quantum optics etc., Markov Chains, useful in the field of statistics, physics, bioinformatics etc., Reliability, useful in quality control and material testing and the most basic numerical methods and concepts like error estimation, order of convergence, stability etc. helpful in various fields of engineering and science. Software like Matlab, MathCAD, Mathematica etc. can be used to simulate the results of various numerical methods.

Prerequisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and probability theory.

COURSE OF CONTENTS

Unit –I

~~**Series solution of ordinary differential equations:** Method of Frobenius. Series solution of Bessel and Legendre's differential equations.~~

~~**Special function:** Bessel's functions and Legendre's polynomials, their recurrence relations, generating functions and orthogonal properties.~~

Unit-II

Markov chain and stochastic process: Definition of Markov chain, Transition matrix, probability distribution in Markov chain, Multi-step in Markov chain.

Reliability: Basic concepts. Failure law, components in series and in parallel, Redundancy.

Unit-III

~~**Bivariate distributions:** Bivariate frequency distributions, Correlation coefficient of bivariate frequency distributions, Regression lines.~~

~~**Multivariate distributions:** Multiple and partial correlation. Equation of regression planes.~~

Unit-IV

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Direct iterative method, Graffe's root squaring method.

~~**Solution of system of linear algebraic equation:** Matrix inversion method, Gauss-elimination Method, Jordan's method, Crout's method. Gauss-Seidel iterative method.~~

Unit-V

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals. Divided differences and central differences.

Numerical differentiation and integration: ~~Nu Diff using Newton forward Backwr& Divided diff formula & sterling Newton Cote's formula, Gaussian quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.~~

BOOKS RECOMMENDED

- [1] Francis J. Scheid, *Schaum's Outline of Numerical Analysis*, McGraw-Hill, New York, 1989.
- [2] Murray R. Spiegel and Larry J. Stephens, *Schaum's Outline of Statistics*, McGraw-Hill, New York: 1999.
- [3] Hwei P. Hsu, *Schaum's Outline of Probability, Random Variables, and Random Processes*, McGraw-Hill, New York: 1997.
- [4] Gupta P.P. & Malik G.S., *Calculus of Finite Differences and Numerical Analysis*, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [5] B.S.Grewal, *Engineering Mathematics*, Khanna Publishers, 12/e,.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3C2 DIGITAL ELECTRONICS	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Provide student knowledge of different number systems and conversion among them.
2. Familiarize students with different logic families and characteristics of Digital IC's
3. Familiarize students with different Combinational IC's.
4. Develop skills to design various Combinational circuits
5. Familiarize students with different Counter IC's
6. Develop skills to design various Sequential circuits
7. Develop ability to implement digital circuits in various practical applications.

Prerequisites: Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE CONTENTS

Unit –I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's-speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

Unit-II

Combinational Circuits: Boolean laws & algebra, Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices

Unit-III

Combinational & Sequential Circuits: Combinational circuit design for Adder, Subtractor, Comparator, Multiplier, various Code converters

Latches and Flip-Flops SR, D, T, JK, Master-slave, Flip- Flop conversions

Unit-IV

Counter and Registers: Synchronous counter, Asynchronous counter, Up-Down Counter, Shift Registers -serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register

Unit-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, DAC808 IC, Analog to Digital Conversions as Flash type, Counter type, Successive Approximations type A/D converter, Specifications of A/D converters, ADC 804 and 808 IC, Monostable, Bistable & Astable multivibrator using IC555.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Understand driving capacity of a gate and voltage-current parameters.
2. Implement digital circuit for arithmetic operations.
3. Implement digital circuit with optimize hardware.
4. Design and Analyse any combinational digital circuit
5. Design and Analyse any sequential circuit
6. Using analog to digital and digital to analog IC's for data conversion.
7. Design circuit to generate clock and pulses of desired frequency.

BOOKS RECOMMENDED:

- [1] Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
- [2] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
- [3] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [4] S Salivahan,S Arivazhagan "Digital Circuit and Design" Vikas Publication ,2013

List of Practical Assignments: During the learning of course, students need to do assignments:

1. To implement various gates using universal NAND/NOR IC's.
2. To Design and Implement various combinational circuits using gate IC's.
3. To Design and Implement various combinational circuits using Mux, D-Mux, Encoder, Decoder IC's.
4. To learn and analyze different Flip-Flops.
5. To Design and Implement various sequential circuits using Flip-Flop.
6. To learn and analyse Counter IC's.
7. To Design and Implement various sequential circuits.
8. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.

Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2EI302 Digital Electronics		L	T	P		TH	CW	S W	P R	Tota l
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objective: Get acquainted with different number systems, their Interconversion and operations. Familiarized with different logic families & relative performance Ability to design various combinational circuits by solving & reducing Boolean equations Ability to synthesis, design and analysis of sequential circuits using Xilinx tools. Understandability of converting analog signal to digital and vice versa. Synchronization and frequency division circuits. Ability to test digital circuits and estimating reliability.

Prerequisite(s): Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE OF CONTENTS

Unit –I

Introduction to Binary System: Number System, Number base conversion, Binary Arithmetic, Various Binary codes, Logic Families: - RTL, DTL, ECL, IIL, TTL & CMOS families

Unit-II

Combinational Circuits: Combinations Logic, ~~Design principles, Analysis and Synthesis Tools & Techniques,~~ Combinational logic design practices like, combinational PLDs, Decoders, Encoders, 3-state Devices, ~~Arithmetic Circuits like Adder, Subtractor, Multiplier, Divider, Comparators for signed and unsigned numbers~~ Practical Designing of combinations circuits design using EDA Software

Unit-III

Sequential Circuits: Sequential Logic Design Practices: Latches and Flip-Flops, ~~Sequential PLDs, Counters, Shift Registers.~~ Sequential Design Methodology, ~~Impediments to Synchronous Design, Synchronizer Failure and Metastability.~~ Sequential Circuit Design Examples Using EDA Software

Unit-IV

Registers: Shift Registers, Universal Shift Registers, ~~Shift Register Counter, Sequence Generators.~~ Memory Devices: Classifications, ~~Static and Dynamic RAM, ROM, Memory Decoding & Expansion CPLDs and FPGAs:~~ Xilinx family, function block architecture, programmable interconnects.

Unit-V

Digital Circuits:

Digital to Analog Conversions: using Pulse width Modulator, ~~Over sampling DAC~~, Binary Weighted DAC, R-2R Ladder, ~~Thermometer Coded DAC, Segmented DAC, Hybrid DAC.~~

Analog to Digital Conversions: using Direct Conversions, Successive Approximations, Delta Encoded, Ramp Compare, Pipeline Method, Sigma Delta methods.

Counting and Timing Circuits: Using decade counters with & without feedback, ~~vernier counting Synchronization and Frequency division circuits: using sweep circuits, stable & Monostable Relaxation circuits, study of sine wave synchronization.~~

Monostable, Bistable & Astable multivibrators: using 555, ~~transistor Testing of Digital Circuits: Tools, Design of Testability, Estimating Digital system Reliability, Transmission lines, reflections and termination.~~

BOOKS RECOMMENDED

- [1] John F. Wakerly, *Digital Design: Principles & Practices*, Low Price Edition, Pearson Education.2003
- [2] Richard F.Tinder, *Engineering Digital Design*, 2/e, Harcourt India Private Ltd., 2001
- [3] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [4] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
- [5] Jacob Millman & Herbert Taub,*Pulse,Digitaland Switching Waveforms*,13th Reprint,Tata McGraw Hill Publishing Company Ltd.,NewDelhi, 1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3C3 DATA STRUCTURE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Learning Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

Prerequisites: Computer Programming knowledge, C Language

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations: static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, Heap Sort, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Learn the basic types for data structure, implementation and application.
2. Know the strength and weakness of different data structures.
3. Use the appropriate data structure in context of solution of given problem.
4. Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983.
- [2] A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
- [3] Kruz, Data Structure and Programming Design, 1987.
- [4] N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
- [5] Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2CO355 Data Structures		L	T	P		T H	C W	S W	P R	Tota l
		4	-	2	Max	10 0	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objective: Use a different algorithm for proper representation of Data to achieve efficiency. To understand an arrangement of memory elements in one or more planes. Way of selection of section of memory and its associated registers used for temporary storage of information in which the item most recently stored is the first to be retrieved. To understand how to sequenced stored data or programs awaiting processing. Development of structure for organizing or classifying data in which every item can be traced to a single origin through a unique path. A Development of diagrams that exhibits a relationship, often functional, between two sets of numbers or procedures.

Prerequisite(s): Knowledge of language ‘C’ used for programming

COURSE OF CONTENTS

Unit-I

Array and Link list: Array: Definition, Representation, Address Calculations; Searching: Linear search, Binary search, Hash Search; Sorting: Bubble sort, Insertion sort, Selection sort; ~~Heap sort, Quick sort, Merge sort~~, Link List: Introduction, Single Link list, Single Circular link List, Doubly link list, Doubly Circular link list.

Unit-II

Stack: Definition, Representations: static and dynamic, ~~Infix, Prefix, and Postfix expressions, Conversion of Infix to Postfix, Evaluation of Postfix expression, Implementation of recursion, removal of recursion.~~

Unit-III

Queue: Definition, Representations: Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, and Implementation of Priority Queue using Heap data structure, applications of queues.

Unit-IV

Tree: Definition, Basic terminology, Binary tree, Complete Binary Tree, ~~Full Binary Tree~~ ; representations: Static and dynamic, Traversing in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree, B⁺tree, B*tree.

Unit-V

Graph: Definition, Basic terminology, Directed and Undirected graph, Connected and Disconnected Graph, Weighted graph, Representations: static, dynamic and mix; Searching in graphs, finding shortest path in a weighted graph, Applications of graph.

BOOKS RECOMMENDED

- [1] E Horowitz & Sahni, *Fundamental Data Structure*, Galgotia Book Source, 1983.
- [2] A Tannenbaum, *Data Structure Using C*, Pearson Education.
- [3] Kruz, *Data Strusture and Programming Design*, 1987.
- [4] N. Wirth, *Algorithms +Data Structure = Program*, Prentice Hall of India, 1979.
- [5] A V Aho, J E Hopcroft & J D Ullman, *the Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3C4 NETWORK ANALYSIS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Learning Objectives:

1. To learn techniques of solving circuits involving different active and passive elements.
2. To analyze the behavior of the circuit's response in time domain.
3. To analyze the behavior of the circuit's response in frequency domain.
4. To understand the significance of network functions.

Prerequisites: Basic course in Electrical

COURSE CONTENTS

UNIT-I

Circuit fundamental and tools of analyzing Network: Elements, Sources, their characteristics, source transformations, Kirchhoff's law, node and loop analysis, D-Y transformation, Network Theorems: Superposition, Reciprocity, Thevenin's, Norton's, Millman and Maximum Power Transfer Theorem, Coupled circuits, Graph Theory

UNIT-II

Time domain analysis of circuits: Transient and steady state analysis of first order and second order systems, initial and final conditions in networks, **Solution of I, II and Higher order differential equation**

UNIT-III

Two Port Networks: Various network parameters, two port parameters – z-parameter, y-parameter, transmission parameter and hybrid parameter, **relationships, Interconnection of two-port networks, terminated two port networks.**

UNIT-IV

Laplace Transforms and Fourier analysis: Basic theorems for Laplace transform, solution of circuit problems using Laplace transform, **Waveform synthesis, Theorem in transform domain,** Fourier analysis of complex waves, symmetries, introduction to Fourier transforms.

UNIT-V

Network Synthesis: **Network functions, significance of poles and zeros, Physical realizability condition, Hurwitz test,** Synthesis of one port network, properties of LC immittances, foster

realization of LC circuits, ladder development and Cauer forms, properties of RC immittances and synthesis of RC circuits.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Understand behavior of different circuits and their response using various circuit analysis tools and theorems
2. Understand the analysis in time domain and frequency domain.
3. Understand basic concepts regarding the system definition mathematically and associated network function.
4. Understand the concept of Network synthesis.

BOOKS RECOMMENDED:

- [1] M.E.Van Valkenburg, Network Analysis, 3/e, Pearson Education.
- [2] Franklin F.Kuo, Network Analysis and Synthesis, 2/e, John Wiley & Sons, 2003
- [3] Donald Scott, An Introduction to Circuit Analysis: A System Approaches, Electrical Engineering Series, McGraw-Hill International Editions., 1987
- [4] T.S.K.V. Iyer, Theory and Problem in Circuit Analysis, TMH Outline Series, Tata McGraw-Hill Publishing Company Ltd, New Delhi., 2000
- [5] Gyanendra K.Mithal & Ravi Mithal, Network Analysis including Transmission Line, 14/e, Khanna Publishers, New Delhi., 2001

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Introduction to various components used in circuit analysis laboratory.
2. Experimental verification of Kirchoff's voltage law and Kirchoff's current law.
3. Experimental verification of Thevenin's theorem.
4. Experimental verification of Nortan's theorem.
5. Experimental verification of Superposition theorem.
6. Experimental verification of Maximum Power transfer theorem.
7. Experimental verification of Reciprocity theorem.
8. Calculation of z-parameters for a two port network.
9. Calculation of y-parameters for a two port network.
10. Calculation of ABCD-parameters for a two port network.
11. Experimental verification for series and parallel interconnection of a two port network.
12. Transient response analysis of a first order and second order circuit.
13. Experimental verification for Fourier series.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2EI304 Circuit Analysis & Synthesis		L	T	P		T H	C W	S W	P R	Tota l
		4	-	2	Ma x	10 0	50	50	50	250
Duration of Theory Paper: 3 Hours					Mi n	35	25	25	25	110

Course Objectives: The objective of the course is to learn techniques of solving circuits with R, L & C elements. Circuits with independent & dependent sources. Dynamics of I and II order networks. Application of Laplace and Fourier transform in solving the circuits. Synthesis of RL, RC, RLC circuits.

Prerequisite(s): Basic course in Electrical.

COURSE OF CONTENTS

Unit-I

Circuit concept and Network Equation: Elements, Sources, their characteristics, source transformations, Kirchoff's law, node and loop analysis, D-Y transformation

Unit-II

Time domain analysis of circuits and Network Theorems: Transient and steady state analysis of first order and second order systems, initial conditions in networks, Superposition, Reciprocity, Thevenin's, Norton's and Maximum Power Transfer Theorem.

Unit-III

Two Port Networks: Various network parameters, their relationships interpretation of poles and zero, effect of their location in the complex plane, two port parameters – z-parameter, y-parameter, transmission parameter and hybrid parameter.

Unit-IV

Laplace Transforms and Fourier analysis: Basic theorems for Laplace transform, solution of circuit problems using Laplace transform, Fourier analysis of complex waves, symmetries, introduction to Fourier transforms.

Unit-V

Network Synthesis: Synthesis of one port network, properties of LC immittances, foster realization of LC circuits, ladder development and Cauer forms, properties of RC immittances and synthesis of RC circuits.

BOOKS RECOMMENDED

- [1] M.E. Van Valkenburg, *Network Analysis*, 3/e, Pearson Education.
- [2] Franklin F.Kuo, *Network Analysis and Synthesis*, 2/e, John Wiley & Sons, 2003
- [3] Donald Scott, *An Introduction to Circuit Analysis: A System Approaches*, Electrical Engineering Series, McGraw-Hill International Editions.,1987
- [4] T.S.K.V. Iyer, *Theory and Problem in Circuit Analysis*, TMH Outline Series, Tata McGraw-Hill Publishing Company Ltd, New Delhi.,2000
- [5] Gyanendra K.Mithal & Ravi Mithal, *Network Analysis including Transmission Line*, 14/e, Khanna Publishers, New Delhi.,2001

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3G1	L	T	P	L	T	P	Total
ELECTRONIC DEVICES AND FABRICATION	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To familiarize the student with the principle of operation, analysis and design of Junction diode, BJT amplifier circuits, and transistors.
2. To understand basic fabrication steps of semiconductor device manufacturing.
3. To study basic principle of filter circuits and various types

Prerequisites: Basic Electronics

COURSE CONTENTS

Unit I

Foundation: The Semiconductor in Equilibrium: Statistical Mechanics, Charge Carriers in Semiconductor, Dopant Atoms and Energy Levels, The Extrinsic Semiconductor, Statistic of Donors and Accepters, Charge Neutrality, Position of Fermi Energy Level.

Unit II

Carrier Transport Phenomena: Carrier Drift, Drift Current Density, Mobility Effect, Conductivity, Velocity Saturation, Diffusion Current Density, Total current density, Carrier Generation and Recombination, Quasi Fermi Level, Excess Carrier Life time.

Unit III

PN Junction: Basic Structure of PN Junction, PN Junction under Zero Bias, Built in Potential barriers, Electric Field, Space Charge Width, PN Junction Under Forward and reverse Bias, minority and majority carrier distribution, Space charge width and electric field in forward and reverse bias, Junction Capacitances, one sided Junctions, Junction breakdowns. PN Junction Current, Small Signal Model of PN Junction.

Unit IV

The Bipolar transistor: Bipolar principal of operation, the modes of operation, Minority carrier distribution, Low frequency Common Base Current Gain, nonideal effects, equivalent circuit models, Frequency Limitations, Current voltage characteristics, BJT as an Amplifier, Small Signal Operation and Models.

Unit V

Single Crystal Structure, Defects in silicon structure, specification of silicon wafer, Crystal growth, CZ method, Oxidation, Diffusion, Ion Implantation, Metallization, Lithography, Process steps for PN Junction Diode, BJT fabrication.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Acquire Knowledge and understanding of Electronics Devices and its operation.
2. Apply acquired knowledge in designing state of art circuits.
3. Able to know the manufacturing steps for Electronics devices

BOOKS RECOMMENDED:

- [1]. Donald Neamen and Dhrubes Biswas, Semiconductor Physics and Devices, Mc Graw Hill Education, 4e.
- [2]. Gouranga Bose, "IC Fabrication Technology", Mc Graw Hill Education, Edition 2014.
- [3]. Adel S Sedra and Kenneth C. Smith, "Microelectronics Circuits Theory and Application", Oxford, Edition Sixth.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester III					
Subject Code & Name		Instructions Hours per Week		Marks					
2EI305 Microelectronics	L	T	P		TH	CW	S W	P R	Total
	4	-	2	Ma x	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: To understand the fundamental laws behind the material preparations of semiconductors. To Develop & Analysis of laws behind the successful design of semiconductor devices. Understand fundamentals of Diodes, Special Diodes their functioning & behaviors. Explain the theory behind the integrated circuit fabrication to understand the design & working principles for Power Diodes.

Prerequisites: Knowledge of Basic Electronics, Concept of Physics as per syllabus studied at Higher Secondary Level.

COURSE OF CONTENTS

Unit-I

Crystal Properties and Growth of Semiconductors: Semiconductor material, Crystal Lattices, Bulk Crystal Growth, Epitaxial Growth etc.

Quantum Mechanics: Physical models, Photoelectric Effect, Atomic Spectra, Bohr model. Probability and uncertainty principles, Schrödinger Wave equations, Potential Well problem, Tunneling.

Energy Bands and Charge carriers in semiconductors: Bonding forces and energy bands in Solids, Charge Carriers in semiconductors, Carrier Concentrations, Drift of Carrier in Electric and magnetic Fields, Invariance of the Fermi level at equilibrium.

Unit-II

Excess carriers in semiconductors: Optical Absorption, Luminescence, Carrier Lifetime and Photoconductivity, Diffusion of Carriers.

Junctions: Fabrications of p-n junctions, Equilibrium conditions, Forward and reverse-biased junctions; steady state conditions, Reverse Bias Breakdown, Transient and AC conditions, Deviations from traditional theory, Metal Semiconductor junctions, Heterojunctions.

PN Junction Diodes: Junction Diode, Tunnel Diode, Photodiodes, Light emitting diodes and lasers.

Unit-III

Bipolar junction Transistors : Amplification and switching, fundamentals of BJT operation, BJT fabrication, Minority carrier distributions and Terminal currents, Generalized

~~Biassing, Switching, Important effects like Drift, base narrowing, avalanche breakdown, injection level ;Base resistance and emitter crowding.~~

~~Field effect transistors: Junction FET, Metal Semiconductor FET, Metal Insulator-Semiconductor FET.~~

Unit-IV

~~**Integrated Circuits:** Advantages of integration, types of integrated circuits, monolith and hybrid circuits, fabrication of monolithic circuits, monolithic device elements, and charge transfer devices, VLSI, Testing Bonding and Packaging.~~

~~**Lasers:** Stimulated Emission, The Ruby laser, other laser system like rare earth systems, gas lasers etc. Semiconductor laser~~

Unit-V

~~**PNPN switching devices:** Switching mechanism, semiconductor Controlled rectifier.~~

~~**Negative conductance microwave devices:** Transit time devices, Gunn Effect and related devices~~

BOOKS RECOMMENDED

- [1] Ben G. Streetman & Sanjay Banerjee, *Solid State Electronic Devices*, 5/e, Prentice-Hall of India Private Limited, New Delhi
- [2] R.C.Jaeger & T.N.Blalock *Microelectronic Circuit Design* , 2/e, Tata-Mcgraw Hill publishing company Ltd, New Delhi.2001
- [3] Allen Mottershed *Electronic Devices and circuits*, Prentice-Hall of India Private Limited, New Delhi.1997

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR3L1 ELECTRONIC WORKSHOP-I	L	T	P	L	T	P	Total
	0	0	1	0	0	1	1
Duration of Theory Paper:							

Learning Objectives:

This course gives the basic introduction of electronic hardware systems and provides hands-on training with familiarization, identification, testing, assembling, dismantling, fabrication and repairing such systems by making use of the various tools and instruments available in the Electronics Workshop.

List of Exercises / Experiments (Minimum of 8 mandatory)

1. Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.]
2. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.
3. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, CRO etc.] [Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.]
4. Testing of electronic components [Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.]
5. Inter-connection methods and soldering practice. [Bread board, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
6. Printed circuit boards (PCB) [Types, Single sided, Double sided, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
7. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (**Any Four circuits**)
 - A. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator.
 - B. LED blinking circuit using a stable multi-vibrator with transistor BC 107.

C. Square wave generation using IC 555 timer in IC base.

D. Sine wave generation using IC 741 OP-AMP in IC base.

E. RC coupled amplifier with transistor BC 107.

Learning Outcomes: Student can identify the active and passive electronic components. Student gets hands-on assembling, testing, assembling, dismantling, fabrication and repairing systems by making use of the various tools and instruments available in the Electronics Workshop.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
2EI356 Electronics Workshop	L	T	P		T H	C W	S W	P R	Tota l
	-	-	2	Max	-	-	50	50	100
Duration of Theory Paper: Nil				Min	-	-	25	25	50

Course Objectives: To understand the criterion selection of component for electronics design. Explain the theory behind the integrated Analog circuit fabrication. To understand the design & working principles for Power supplies To Develop & Analysis of successful design of Electronics circuit

Prerequisite(s): Knowledge of Basic Electronics,

COURSE OF CONTENTS

Unit-I

~~Study of various types of components like Resistors, Capacitors, Diodes, Transistor, Inductors, Power Component like Power diode, Power Transistor. Study of different types of cables, cable sockets, connectors, switches & relays. From this study student will develop the familiarity of the component, their selection criterion, how to read the data tables etc.~~

Unit-II:

~~Selection of solder, Soldering wires and fluxes. Techniques of Soldering~~

Unit-III

~~Types of PCBs, & selection of PCB, techniques of making PCB for projects and mass manufacturing, layout of components and precaution, electrical wiring diagrams elements of grounding and shielding PCB layout practice.~~

Unit-IV

~~Fabrication of power supplies. Study of various type of power supplies techniques~~

Unit-V

~~Student will develop the minor electronic project for the practices of above theory. During development of the project familiarity of different EDA tools will develop.~~

BOOKS RECOMMENDED

- [1] John R. Barnes, *Robust Electronic Design* Reference Book Volumes 1 and 2, Kluwer Academic Publishers, 2004
- [2] James W Nilsson, Susan Riedel, *Introduction to PSpice Manual: Electric Circuits: Using Orcad Release 9.1*, Oxford University Press 2006

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SIR3S3 EFFECTIVE COMMUNICATION SKILL	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisites: Technical English

COURSE CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Types of Communication; Art of Communication.

Unit-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts .; Telephone speaking skills and Cross-cultural communication skills

Unit-III

Fundamentals of public Speaking- Speeches on topics of current concern ,listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

Unit-IV

Interviews: Points to be remembered as an interviewer or an interviewee; Commonly asked questions; Types of interviews; Do's and Don'ts.

Unit-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Nonverbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Note: There shall be seminars and practice sessions by students.

Learning Outcomes:

Upon Completing the Course, Student will able to deliver the *seminars and making presentation.*

BOOKS RECOMMENDED:

[1] P D Chaturvedi, P.D. & M Chaturvedi, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.

[2] ICMR, *Business Communication*, Feb 2001.

[3] J Davies, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education, 2006.

[4] Lecture material given by the course teacher.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2SS007 Effective Communication Skills		L	T	P		T H	C W	S W	P R	Tota l
		2	-	-	Ma x	-	50	-	-	50
Duration of Theory Paper: Only Internal Tests					Min	-	25	-	-	25

Objective: To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisite: Technical English

COURSE OF CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Why Communication is necessary?; Art of Communication.

Unit-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts; Telephone speaking skills and Cross-cultural communication skills

Unit-III

Listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

Unit-IV

Interviews: Points to be remembered as an interviewer or an interviewee; Commonly asked questions; Types of interviews; Do's and Don'ts.

Unit-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Non-verbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Note: There shall be seminars and practice sessions by students.

BOOKS RECOMMENDED

- [1] P D Chaturvedi, P.D. & M Chaturvedi, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.
[2] ICMR, *Business Communication*, Feb 2001.

- [3] J Davies, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e
Pearson Education, 2006.
- [4] Lecture material given by the course teacher.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR4C1 COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- To identify the elements of modern instructions sets and their impact on processor design To explain the function of each element of a memory hierarchy,
- To identify and compare different methods for computer I/O.

Prerequisite(s): Knowledge of logic circuits - combinational and sequential

COURSE CONTENTS

Unit I: Computer Organization

Computer types, Structure with basic computer components, Function in brief with instruction fetch and execute, Interrupts and I/O communication, Interconnection structure, bus interconnection, Multiple Bus hierarchies, Elements of bus design Performance metrics and measurement

Unit II: Computer Memory System

Characteristics of memory system, Memory hierarchy, Cache Memory- Cache memory principles, Elements of cache design- cache address, size, mapping functions, replacement algorithms, write policy, Internal Memory- semiconductor memory, External Memory- Hard Disk organization, RAID

Unit III: Input and Output System

I/O modules- Module function and I/O module structure, Programmed I/O , Polling I/O, Interrupt driven I/O , DMA function, Synchronous and Asynchronous serial data communication, Computer peripherals like keyboard, mouse, printer, scanner and display devices

Unit IV: Processor Organization

Evolution of Intel processor architecture- 4 bit to 64 bit, Control unit Hardwired and micro programmed, concept of pipelining , Study of microprocessor 8085,Functional pins and Register organization, Memory mapped I/O and I/O mapped I/O schemes,

Unit V: Instruction Set and Assembly Language Programming

Addressing modes and Formats- immediate, direct, indirect, register, register indirect, displacement and stack, Instruction Cycle machine cycle and Data flow, 8085 instruction set and assembly programming, Time delay concept , stack and subroutines, Interrupt handling, Instruction set architecture RISC and CISC

Learning Outcomes:

On completion of the course, student will be able to :

- Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
- Analyze the performance of commercially available computers.
- To develop logic for assembly language programming

BOOKS RECOMMENDED

[1] William Stallings, “*Computer Organization and Architecture*”, Prentice Hall of India, Sixth Edition.

[2] A. Tannenbaum, “*Structured Computer Organization*”, Pearson Education, 2002.

[3] Patterson & Hennessy, “*Computer Organization and Design*”, Morgan Kaufmann, 2007

[4] Ramesh S. Gaonkar, “*Microprocessor, Architecture, Programming, and Applications with the 8085*”, Penram International Publication, 5/e

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
2CO352 Digital Computer Organization	L	T	P		T H	C W	S W	PR	Tota l
	4	-	-	Ma x	10 0	50	-	-	150
Duration of paper: 3 Hours				Mi n	35	25	-	-	60

Course Objectives: Designing an ALU, instruction format, analyzing addressing methods and performance. Understanding control unit designing and ability to represent and operate on numbers. Understanding I/O device handling and bus arbitration issue. Ability to analyze performance issues of different memories. Enhancing and analyzing computer performance by pipelining and multiprocessor concept.

Prerequisites: Fundamental knowledge of computer system and peripherals, number system, digital electronics

COURSE OF CONTENTS:

Unit-I

Computer Structure Overview, Addressing Methods & Program Sequencing

~~Overview, Operational Concepts, hardware Software, Performance, Addressing Methods—Memory locations, Addresses & Encoding of Information, Main Memory Operations. Instruction Sequencing—Straight line Sequencing, Branching. Addressing Modes, Basic I/O Operations, Stack and Queues, Subroutines etc.~~

Unit-II

The Processing Unit and arithmetic operations

~~Processor Organization, Operational Concepts, Instruction Execution, Hardwired Control, Microprogram Control—Microinstructions, Microprogram Sequencing ,RISC and CISC, integer and floating point representation ,signed unsigned numbers and operations~~

Unit-III

Input-Output Organization and bus structure

I/O Device Access Methods, Interrupt Handling, Device Handling, Exception Handling, Direct Memory Access, interrupt controller, daisy chaining, parallel, priority interrupt, I/O Interfaces Bus structure, bus design issues, Synchronous –Asynchronous bus, bus arbitration

Unit-IV

Memory System

~~Memory hierarchy, primary secondary memory operational Concepts and different types as RAM ROM and their variations, hard disk, floppy, RAID, CD, DVD etc. Cache Memory Mapping, Replacement Algorithms, Types. Performance Considerations etc.~~

Unit-V

Pipelining and Parallel computer architecture

~~Pipelining Operational Concepts, Data Dependency etc., design issues for parallel computer, classification, array processor, vector processor, shared memory processors, UMA, NUMA, COMA, interprocessor arbitration~~

BOOKS RECOMMENDED

- [1] V. Hamacher, S. Zaky, *Computer Organization*, McGraw Hill International, Fifth Edition.
- [2] William Stallings, *Computer Organization and Architecture*, Pearson Education, Sixth Edition.
- [3] A. Tannenbaum, *Structured Computer Organization*, Pearson Education, 2002.
- [4] Patterson & Hennessy, *Computer Organization and Design*, Morgan Kaufmann, Third Edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR4C2 ELECTRICAL AND ELECTRONIC MEASUREMENT	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce students to monitor, analyze and control any physical system.
- To understand students how different types of meters work and their construction.
- To provide a student a knowledge to design and create novel products and solutions for real life problems.
- To introduce students a knowledge to use modern tools necessary for electrical projects.

Prerequisites(s): Basic Electrical Engg and Basic Electronics

COURSE CONTENTS

UNIT-I

Basic concept of Measurements and Instruments, Measurement Methods, Generalized measurement System, Classification of Instruments, Static & Dynamic Characteristics, Errors & Uncertainty measurement of system, Linear & Non-linear Systems.

UNIT-II

Operation principles of Analog Instruments - Moving coil, Moving iron, PMMC, Dynamometer and Induction type instruments, Measurement of Voltage, Current, Power, Power Factor, Energy, Instrument Transformer - current and potential transformer, Measurement of Phase & Frequency.

UNIT-III

Measurement of Resistance- low, medium and high resistance measurement, A.C. Bridges-general equation, Potentiometer- DC potentiometer, Multi-range potentiometer, AC

potentiometer and their applications, High Frequency Measurement, Twin T & Bridge Networks, Q-meter and its applications.

UNIT-IV

Display Devices I- Construction & working of Basic CRO, its Components (Deflection plates, Screen, Aquadag, Time Base Generator, Oscilloscope Amplifiers), Measurements of phase and frequency (Lissajous Patterns), Types of CRO, Special types of CRO, Types of CRO Probes.

UNIT-V

Display Devices II- Digital Voltmeter (ramp type DVM, Integrating and Potentiometric type DVMs), Signal Generator, Function Generator, Wave Analyzer, Distortion Analyzer, Spectrum Analyzer, Frequency Counter, Display Devices & Recorders.

Learning Outcomes: Upon Completing the Course, Student will able to:

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy.
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.
- Ability to use Digital voltmeters

BOOKS RECOMMENDED:

[1] A.K.Sawhney & Puneet Sawhney, “A Course in Electrical And Electronic measurements and Instrumentation”, 7/e, Dhanpat Rai & Co.(P) Ltd.,2005

[2] Albert D.Helfrick & William D.Cooper, “Modern Electronic Instrumentation and measurement Technique”,Low Price Edition, Pearson Education, 2005

[3] Ernest O.Doebelin, “Measurement Systems Application and Design”, 5/e, Tata McGraw – Hill Publishing Company Ltd., 2004

[4] H.S.Kalsi, “Electronic Instrumentaion”, Technical Education Series, Tata McGraw –Hill Publishing Company Ltd.,2001

[5] Alan S.Morris, “The Essence of Measurement”, Eastern Economic Edition, Prentice Hall of India Private Limited.,1997

List of Practical Assignments:

- 1.** To calibrate test Ammeter with reference Ammeter and hence detection of deviation of the test ammeter from reference ammeter using comparison method.
- 2.** To calibrate test Voltmeter with reference Voltmeter and hence detection of deviation of the test Voltmeter from reference Voltmeter using comparison
- 3.** To calibrate test Wattmeter with reference Wattmeter and hence detection of deviation of the test Wattmeter from reference Wattmeter using comparison method.
- 4.** To calibrate test Energy meter with reference Energy meter and hence detection of deviation of the test Energy meter from reference Energy meter using comparison method.
- 5.** To study Hay's Bridge and hence determination of unknown value of Self Inductance of given coil using Hay's Bridge.
- 6.** To study Anderson Bridge and hence determination of unknown value of Self Inductance of given coil using Anderson Bridge.
- 7.** To study Schering's Bridge and hence determination of unknown value of Capacitance of given coil using Schering's Bridge.
- 8.** To study Maxwell's Bridge and hence determination of unknown value of Inductance of given coil using Maxwell's Bridge.
- 9.** To study Wien's Bridge and hence determination of unknown value of Capacitance of given coil using Wien's Bridge.
- 10.** To study De Sauty Bridge and hence determination of unknown value of Capacitance of given coil using De Sauty Bridge.
- 11.** To study Kelvin's Bridge and hence determination of unknown value of very low resistance of given coil using Kelvin's Bridge.
- 12.** To study the construction detail of CRO including measurement of voltage, Phase and frequency with the help of CRO.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2EI303 Electrical and Electronic Measurements		L	T	P		TH	CW	S W	P R	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objective: The objective of the course is to learn about design of various measuring instruments. Basic of R,L & C measurement. Concepts of measurement of voltage, current & power. Study & working of CRO and its type. Principles of AC bridges. High Frequency measurement Working of Digital instrument.

Prerequisite: Basic course in Electronics & Electrical

COURSE OF CONTENTS

Unit –I

Basic concept of Measurements and Instruments, Measurement Methods, Generalized measurement System, Classification of Instruments, Static & Dynamic Characteristics, Errors & Uncertainty measurement of system, Linear & Non-linear Systems.

Unit-II

Operation principles of Analog Instruments - Moving coil, Moving iron, PMMC, Dynamometer and Induction type instruments, Measurement of Voltage, Current, Power, Power Factor, Energy, Instrument Transformer - current and potential transformer, Measurement of Phase & Frequency.

Unit-III

Measurement of Resistance- low, medium and high resistance measurement, A.C. Bridges- general equation, ~~Maxwell's bridge, Maxwell's capacitance bridge, Anderson bridge, Hay's bridge, Owen's bridge, De Sauty's bridge, Schering bridge,~~ Potentiometer- DC potentiometer, Multi-range potentiometer, AC potentiometer and their applications, High Frequency Measurement- measurement of R,L,C at high frequency , Twin T & Bridge Networks, Q-meter and its applications.

Unit-IV

Analog & Digital Comparison- ~~Voltmeters, Digital Voltmeters,~~ Construction & working of Basic CRO, its Components, Types of CRO, Special types of CRO, Types of CRO Probes.

Unit-V

Signal Generator, Function Generator, Wave Analyzer, Distortion Analyzer, Spectrum Analyzer, Frequency Counter, Display Devices & Recorders.

BOOKS RECOMMENDED

- [1] A.K.Sawhney & Puneet Sawhney, *A Course in Electrical And Electronic measurements and Instrumentation*, 7/e, Dhanpat Rai & Co.(P) Ltd.,2005
- [2] Albert D.Helfrick & William D.Cooper, *Modern Electronic Instrumentation and measurement Technique*, Low Price Edition, Pearson Education, 2005
- [3] Ernest O.Doebelin, *Measurement Systems Application and Design*, 5/e, Tata McGraw –Hill Publishing Company Ltd., 2004
- [4] H.S.Kalsi,*Electronic Instrumentaion*, Technical Education Series, Tata McGraw –Hill Publishing Company Ltd.,2001
- [5] Alan S.Morris,*The Essence of Measurement*, Eastern Economic Edition, Prentice Hall of India Private Limited.,1997

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4C3	L	T	P	L	T	P	Total
ANALOG ELECTRONICS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To recall various BJT parameters, connections and configurations.
- To Explain and Demonstrate BJT Amplifier, Hybrid Equivalent and Hybrid Models.
- To explain construction and characteristics of JFETs and MOSFETs.
- To explain various types of FET biasing, and demonstrate the use of FET amplifiers.
- To Demonstrate and Construct Frequency response of BJT and FET amplifiers at various frequencies.
- To Define, Demonstrate and Analyze Power amplifier circuits in different modes of operation.
- To Demonstrate and Apply Feedback and Oscillator circuits using FET.

Prerequisites: Basic knowledge and understanding of semiconductor devices and operation required.

COURSE CONTENTS

Unit I

BJT AC Analysis: BJT AC Analysis:

BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration. Darlington connection-DC bias; The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit Fixed bias, Voltage divider, Emitter follower configuration; Complete Hybrid equivalent model, Hybrid π Model.

Unit II

Field Effect Transistors: Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET. **FET Amplifiers:**

JFET small signal model, Fixed bias configuration, Self-bias configuration, Voltage divider configuration, Common Gate configuration. Source-Follower Configuration, Cascade configuration.

Unit III

BJT and JFET Frequency Response:

Logarithms, Decibels, Low frequency response – BJT Amplifier with RL, Low frequency response FET Amplifier, Miller effect capacitance, High frequency response – BJT Amplifier, High frequency response-FET Amplifier, Multistage Frequency Effects.

Unit IV

Feedback and Oscillator Circuits:

Feedback concept, Feedback connection types, Voltage Series, Voltage Shunt, Current Series, Current Shunt, practical feedback circuit Phase shift oscillator, wien bridge oscillator, colpitts Oscillator, hartely oscillator, Crystal Oscillator.

Unit V

Power Amplifiers:

Definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation and circuits, Amplifier distortion, Class C and Class D amplifiers. Voltage regulators: Discrete transistor voltage regulation - Series and Shunt Voltage regulators.

Learning Outcomes: After studying this course, students will be able to:

- Acquire knowledge of and Working principles, characteristics and basic applications of BJT and FET.
- Single stage, cascaded and feedback amplifier configurations and Frequency response characteristics of BJT and FET.
- Analyze the performance of FET amplifier in CS configuration and Power Amplifiers and Oscillator circuits.
- Interpretation of performance characteristics of transistors amplifiers, frequency Response and Oscillators.
- Apply the knowledge gained in the design of transistorized circuits, amplifiers and Oscillators.

BOOKS RECOMMENDED

- [1]. Adel S. Sedra and Kenneth C. Smith, “*Micro Electronic Circuits Theory And Application*,” 5th Edition ISBN:0198062257
- [2]. Behzad Razavi, “*Fundamentals of Microelectronics*”, John Wiley ISBN 2013 978-81- 265-2307-8
- [3]. J.Millman & C.C.Halkias, ”*Integrated Electronics*”, 2nd edition, 2010, TMH. ISBN 0- 07-462245-5
- [4]. K. A. Navas, “*Electronics Lab Manual*”, Volume I, PHI, 5th Edition, 2015, ISBN:9788120351424.

List of Practical Assignments:

1. Realize BJT Darlington Emitter follower with and without bootstrapping and determine the gain, input and output impedances.
2. Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain bandwidth product from its frequency response.
3. Plot the transfer and drain characteristics of a JFET and calculate its drain resistance, mutual conductance and amplification factor.
4. Design, setup and plot the frequency response of Common Source JFET/MOSFET amplifier and obtain the bandwidth.
5. Plot the transfer and drain characteristics of n-channel MOSFET and calculate its parameters, namely; drain resistance, mutual conductance and amplification factor.
6. Set-up and study the working of complementary symmetry class B push pull power amplifier and calculate the efficiency.
7. Design and set-up the RC-Phase Shift Oscillator using FET, and calculate the frequency of output waveform.
8. Design and set-up the following tuned oscillator circuits using BJT, and determine the frequency of oscillation. (a) Hartley Oscillator (b) Colpitts Oscillator
9. Design and set-up the crystal oscillator and determine the frequency of oscillation

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) VI Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3EI352 Soft Computing Techniques	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	35	25	25	25	110

Objective: To provides an understandable approach to Soft Computing based methods for problem solving by combining different methods of AI, fuzzy systems, and neural networks.

Prerequisite: Overview of Artificial Intelligence and Digital systems.

COURSE OF CONTENTS

Unit-I

Fuzzy Set Theory and Fuzzy Relations:

Classical Sets and Fuzzy Sets, Classical Set. Operations on Classical Sets, Properties of Classical Sets, Mapping of Classical Sets to a Function, Fuzzy Sets, Fuzzy Set Operations, Properties of Fuzzy Sets, Classical and Fuzzy Relations, Cartesian Product of Classical Relations, Fuzzy Relations, Tolerance and Equivalence Relations, Fuzzy Numbers, Fuzzy Arithmetic, Alpha cut, MATLAB based Exercises.

Unit-II

Introduction to Fuzzy Inference System:

Membership Functions, Introduction, Features of Membership Function, Classification of Fuzzy Sets, Fuzzification, Membership Value Assignments, Defuzzification, Lambda Cuts for Fuzzy Sets, Lambda Cuts for Fuzzy Relations, Defuzzification Methods, Fuzzy Rule Based System, Formation of Rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Properties of Set of Rules, Fuzzy Inference System, Fuzzy Inference Methods, Mamdani's Fuzzy Inference Method, Takagi-Sugeno Fuzzy Method (TS Method), MATLAB based problems.

Unit-III

Neural Networks and Perceptron model

Introduction to Neural Network. Models of a Neuron. Network Architectures. Learning Processes. Supervised and Unsupervised Learning. Perceptron. Back Propagation Algorithm. XOR Problem. Generalization. Approximations of Functions. Self Organizing Map algorithm. Learning Vector Quantization, MATLAB based problems.

Unit-IV

Fuzzy Neural Networks

Integration of fuzzy logic and neural networks, Fuzzy Hybrid neural, Computation of fuzzy logic inferences by hybrid neural net, Tuning fuzzy control parameters by neural nets, Fuzzy rule extraction from numerical data, Neuro-fuzzy classifiers, ANFIS, Applications of fuzzy neural systems, MATLAB based problems

Unit-V

Genetic Algorithms

Introduction, Structure of Evolutionary Algorithms, Components of Evolutionary Algorithms, Representation, Evaluation/Fitness Function, Population Initialization, Selection, Recombination, Mutation, Reinsertion, Multi-objective Evolutionary Algorithms, and MATLAB based problems

BOOKS RECOMMENDED

- [1] S. Haykin, "Neural Networks: A Comprehensive Foundation", Prentice Hall, 1999.
- [2] G J Klir and T A Folger, "Fuzzy sets, uncertainty, and information", Prentice-Hall, 1992.
- [3] D. Driankov, H. Hellendoorn and M Reinfrank, "An introduction to fuzzy control", Springer-Verlag, 1993.
- [4] G J Klir and B Yuan, "Fuzzy Sets and Fuzzy Logic - Theory and Applications", Prentice-Hall, 1995.
- [5] C. Bishop, "Neural Networks for Pattern Recognition", Oxford University Press, 1995..

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4C4 SENSOR AND TRANSDUCERS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To develop good understanding on the principle of operation and the important characteristics of Sensor & Transducers commonly used in industry. Knowledge of recent developments in the field of Sensor & Transducers. Criterion for selection, installation of suitable sensing elements and to design the appropriate signal conditioning circuit for their specific measurement applications.

COURSE OF CONTENTS

Unit 1: Transducer Fundamentals

Basic concept of Sensors and transducer, their comparisons, Classification of Transducer, Working of transducers used for measurement of Displacement- resistive, inductive and capacitive method, Linear and Angular Velocity moving coil and moving magnet method, various tachometers and stroboscope, Acceleration- seismic and piezo electric accelerometer, Working principle of Capacitive Transducer, Piezo-Electric Transducer, and LVDT.

Unit 2: Strain and Temperature Measurement

Strain Gauges- strain measurement technique, resistance strain gauge and its types, Signal conditioning of strain gauges, Transducers for Temperature Measurement- non- electrical and electrical method, Bimetallic Thermometer, Resistance Thermometer like RTD, Thermistor and Thermocouple, Radiation and Optical Pyrometer.

Unit 3: Pressure Measurement

Transducers for Measurement of Pressure: - Manometers types (like Single column, inclined, U-tube), Mechanical Types (Bourdon, bellows and diaphragm), Elastic Types transducers, Low Pressure measurement gauges (Ionization, McLeod etc.).

Unit 4: Flow Measurement

Transducers for Measurement of Flow: - Types of flow meters, Theory of variable head constant area meter and its types, theory of constant head variable area meter and its types, theory of variable head variable area meter and its types, Special flow meters- Electromagnetic, Hot wire Anemometer, Turbine meter and Ultrasonic flow meter.

Unit 5: Miscellaneous Measurement and Smart Sensor

Transducer for Level Measurement:- direct and indirect method, resistive method, Ultrasonic, Capacitive and Gamma Ray level Gauges. Measurement of Humidity and Moisture- basic definitions, psychometric method, **Smart sensors - Fibre optic sensors, MEMS – Nano sensors, proximity sensor.**

Learning Outcomes: After successful completion of this course, students should

1. Understand the fundamental principles of various types of sensors including thermal, mechanical, electrical, electromechanical and optical sensors.
2. Understand their general characteristics, terminologies, sensing and transduction principles;
3. Be familiar with criteria for sensors and transducers selection and choose appropriate measurement methods for engineering tasks and scientific researches.

BOOKS RECOMMENDED:

- [1].A.K.Sawhney & Puneet Sawhney, A Course in Mechanical Measurements and Instrumentation, 12/e, , Dhanpat Rai & Co. (P) Ltd.,2004
- [2].B.C.Nakra & K.K.Chaudhary,Instrumentation Measurement And Analysis, Tata McGraw-Hill Publishing Company Ltd, New Delhi.,1996
- [3].D.Patranabis, Principles of Industrial Instrumentation, 2/e, Tata McGraw-Hill Publishing Company Ltd, New Delhi.,1998
- [4].James W. Dally, William F. Riley & Kenneth G.McConnell, Instrumentation for Engineering Measurements,2/e,Wiley Student Edition, John Wiley & Sons,INC,2003.
- [5].John P.Bentley, Principles of Measurement Systems, Low Price Edition, Pearson Education Asia,2000
- [6].Dr.D.S.Kumar, Mechanical Measurements and Control, 3/e, Reprint-2004, Metropolitan Book Co. Private Ltd.,2004
- [7]. Liptak, B.G., “Instrumentation Engineers Handbook (Measurement)”, CRC Press, 2005.

List of Practical's:

1. Measurement of Temperature using Thermocouple.
2. Measurement of Temperature using Thermistor.
3. Measurement of Temperature using RTD.

4. To measure linear displacement using LVDT.
5. To study the principle and functioning of Load Cell (Cantilever type).
6. To study the principle and functioning of Load Cell (Strain gauge type).
7. To measure angular displacement using Capacitive Gauge.
8. To study the functioning of capacitive based digital water level indicator.
9. To study the conductivity meter
10. To measure pressure using Manometer.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2EI354 Sensors and Transducer		L	T	P		TH	CW	S W	P R	Tota l
		4	-	2	Ma x	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objective: To develop good understanding on the principle of operation and the important characteristics of Sensor & Transducers commonly used in industry. Knowledge of recent developments in the field of Sensor & Transducers. Criterion for selection, installation of suitable sensing elements and to design the appropriate signal conditioning circuit for their specific measurement applications.

Prerequisite(s): Knowledge of Basic Electronics

COURSE OF CONTENTS

Unit-I

Basic concept of Sensors and transducer, their comparisons, Classification of Transducer, Working of transducers used for measurement of Displacement- resistive, inductive and capacitive method, Linear and Angular Velocity- moving coil and moving magnet method, various tachometers and stroboscope, Acceleration- seismic and piezo electric accelerometer, Working principle of Capacitive Transducer, Piezo-Electric Transducer, and LVDT.

Unit-II

Strain Gauges- strain measurement technique, resistance strain gauge and its types, Signal conditioning of strain gauges, Transducers for Temperature Measurement- non- electrical and electrical method, Bimetallic Thermometer, Resistance Thermometer like RTD, Thermistor and Thermocouple, Radiation and Optical Pyrometer.

Unit-III

Transducers for Measurement of Pressure: - Manometers types, Mechanical Types, Elastic Types transducers, Low Pressure measurement gauges.

Unit-IV

Transducers for Measurement of Flow: - Types of flow meters, Theory of variable head constant area meter and its types, theory of constant head variable area meter and its types, theory of variable head variable area meter and its types, Special flow meters- Electromagnetic, Hot wire Anemometer, Turbine meter and Ultrasonic flow meter.

Unit-V

Transducer for Level Measurement:- direct and indirect method, resistive method, Ultrasonic, Capacitive and Gamma Ray level Gauges. Measurement of Humidity and Moisture- basic definitions, psychometric method.

BOOKS RECOMMENDED

- [1] A.K.Sawhney & Puneet Sawhney, *A Course in Mechanical Measurements and Instrumentation*, 12/e, Dhanpat Rai & Co. (P) Ltd., 2004
- [2] B.C.Nakra & K.K.Chaudhary, *Instrumentation Measurement and Analysis*, 2/e, TATA McGraw-Hill Publishing Company Ltd, New Delhi., 2003
- [3] D.Patranabis, *Principles of Industrial Instrumentation*, 2/e, Tata McGraw-Hill Publishing Company Ltd, New Delhi., 1998
- [4] John P.Bentley, *Principles of Measurement Systems*, Low Price Edition, Pearson Education Asia, 2000
- [5] Dr.D.S.Kumar, *Mechanical Measurements and Control*, 3/e, Reprint-2004, Metropolitan Book Co. Private Ltd., 2004

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4G2	L	T	P	L	T	P	Total
SIGNAL & SYSTEMS	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course aims to provide detailed description Signals and System Analysis. Fourier series and Fourier transform, Laplace and Z Transform along with respect to SISO systems and State variable analysis for MIMO systems.

Prerequisite(s): Engineering Mathematics

COURSE CONTENTS

UNIT-I Fundamentals of Signals & Systems:

All basic Continuous time signals. Energy signal and Power signal. Continuous time systems, Discrete time signals and Discrete time systems. Linear Time invariant system theory and its significance to continuous time and discrete time system analysis. Linear convolution Integral and Linear convolution sum.

UNIT-2 Fourier series and Fourier Transform:

Fourier series, Different forms of Fourier series, Dirchlet conditions, Wave symmetry, Parseval theorem. Fourier Transform; its properties and applications. Symmetry properties of Fourier transform. System analysis with Fourier transform. Ideal Filters.

UNIT-3 Laplace Transform and its applications:

Laplace Transform and its properties. Region of convergence, Laplace Transform of some common functions, Initial value and Final value theorem. Inverse Laplace Transform, Transfer function, Characteristics of transfer function, Poles and Zeros, System analysis using Laplace Transform.

UNIT-4 State Variable Techniques:

Introduction, State Variable Concept, Form of state equations, State space representation of continuous time and discrete time LTI systems, solution of state equation, state transition matrix.

UNIT -5 Discrete Time Signal/Systems and Z-Transform:

Introduction, Z-Transform definition, Region of Convergence, Z-Transform of some common sequences, properties of Z-Transform, Inverse Z-Transform, System function of discrete time, LTI Systems, Convolution Theorem, Complex Convolution Theorem.

Learning Outcomes:

On Completion of this course the students will be able to:

- The focus of this course is to familiarize the students with the concept of Fourier transform & Fourier series.
- Analyze the spectral characteristics of signals using Fourier analysis.
- Classify systems based on their properties and determine the response of LTI
- Identify system properties based on impulse response and Fourier analysis.
- Apply transform techniques to analyze continuous-time and discrete-time

BOOKS RECOMMENDED:

[1] Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin, “*Signals and Systems*”, Pearson 4th Edition

[2] Hwei P. Hsu (Schaum's Outline Series), “*Signals and Systems*”, TMH Edition

[3] A. Anand Kumar, “*Signals and Systems*”, PHI 3rd Edition

[4] A.V. Oppenheim et al, “*Signals and Systems*”, 2nd Edition, Pearson 2003

[5] Smarajit Ghosh, “*Signals and Systems*”, Pearson

[6] Simon Haykin , “*Signals and Systems*” 2nd edition, Wiley, 2008.

[7] B P Lathi, “*Digital and Analog Communication Systems*” 4th edition, Oxford University Press, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Instrumentation) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2AM351 Applied Mathematics-IV		L	T	P		TH	CW	S W	P R	Tota l
		4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours					Min	35	25	-	-	60

Objective: To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas in various branches of engineering like electromagnetic and electrostatic field theory, fluid dynamics, control, communication and signal processing, design of discrete (time) systems, circuit analysis etc.

Prerequisites: Algebra of complex numbers, integration, basic properties of functions.

COURSE OF CONTENTS

Unit-I

Function of Complex variables: Analytic functions, Cauchy Riemann conditions, Harmonic functions, Conjugate functions and their applications.

Complex integral: Integration of complex functions, simply and multiply connected regions, Cauchy's integral theorem, Cauchy's integral formula, Singularities, Zeroes, Residues and Residue theorem.

Unit-II

Difference equation: Definition of difference equations, formation of difference equation.

Solution of difference equations: Solution of Homogeneous and non-homogeneous difference equation with constant and variable coefficients using operator method and generating functions. Simultaneous difference equation.

Unit-III

Laplace transform: Definition and properties of Laplace transform, Inverse Laplace Transforms. Convolution theorem.

Application of Laplace transform in solution of ordinary differential equations:

Solution of ordinary differential equations with constant and variable coefficients, Simultaneous differential equations with constant coefficients.

Unit-IV

Z-transform: Definition and properties of Z transform, Convergence of Z transforms, Evaluation of inverse Z transforms. Convolution theorem.

Application of Z-transform in solution of difference equations: Solution of difference equations with constant coefficients.

Unit-V

Fourier transform: Fourier Integral and Fourier transforms, Fourier sine and cosine transforms, Finite Fourier sine and cosine transform.

Application of Fourier transform in solution of partial differential equations:

Solution of partial differential equations with constant and variable coefficients.

RECOMMENDED BOOKS:

[1] Murray R. Spiegel, *Schaum's Outline of Complex Variables*, McGraw Hill, New York, 1968.

[2] Murray Spiegel, *Schaum's Outline of Theory and Problems of Advanced Mathematics for Engineers and Scientists*, McGraw Hill, New York, 2002.

[3] A. R. Vasishtha & Dr. R. K. Gupta, *Integral Transform*, Krishna Prakashan Mandir, Meerut, 21/e, 2003.

[4] Murray R. Spiegel, *Schaum's Outline of Fourier Analysis*, McGraw Hill, New York, 2004.

[5] B.S.Grewal, *Engineering Mathematics*, Khanna Publishers, 12/e, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4L2 ELECTRONIC WORKSHOP II	L	T	P	L	T	P	Total
	0	0	1	0	0	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize students with various Electronic devices and their specifications.
- Develop skill for Design and Testing of different types of Electronic subsystems using Analog and Digital IC's
- Familiarize students with PCB layout tool to prepare PCB print for assigned project.
- Develop skills of writing a structured technical document for project and its presentation.
- Develop ability to diagnose faults and their rectification.

COURSE CONTENTS

List of Exercises / Experiments

1. Familiarization /Identification of electronic components with specification and Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.

2. Drawing of electronic circuit diagrams using EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.

3. Familiarization/Application of testing instruments and commonly used tools like Multimeter, Function generator, Power supply, CRO etc. Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.

4. Testing of electronic components Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter and different IC's using IC tester.

5. Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]

6. Assembling electronic circuit/system on general purpose PCB, testing and show the functioning (Total two projects. **Any one from 1-13 and one from 14-18 project list**)

List of Projects

1. Fastest Finger First Indicator Project

2. Fire Alarm Circuit

3. Plant Watering Watching Indicator

4. Clap switch for operating electric equipment like fan, bulb

5. Mobile Battery Charger

6. 7 Segment Counter

7. Metal Detector

8. Electronic letter box

9. Traffic Light circuit

10. Light-Sensitive Fire Alarm

11. Infrared Motion-Sensing Relay Switch

12. LPG Leakage Detector

13. Motion Detector Using NE555 Timer

14. Design and implement a single stage voltage amplifier using BJT in common emitter configuration for a gain of 10 to amplify input voltage 10 mVp-p, 10-100 KHz. Also tabulate the results for different input range.

15. Design and implement a two stage R-C coupled amplifier using BJT in common emitter configuration for a gain of 100 to amplify input voltage 1mVp-p, 10-100 KHz. Also tabulate the results for different input range.

16. Design and implement LOW PASS, HIGH PASS filter using OP-AMP with cut off frequency 10 KHz and a bandpass filter with passband of 100 KHz.

17. Design and implement variable frequency and variable amplitude triangular waveform generator using OP-AMP. Tabulate the frequency range and amplitude range for the implemented circuit.

18. Design and implement variable frequency and variable amplitude square waveform generator using OP-AMP. Tabulate the frequency range and amplitude range for the implemented circuit.

Learning Outcomes:

Upon completing the course, students will be able to design, test and implement any Analog or Digital circuit by making use of the various tools and instruments available in the Electronics Workshop.

BOOKS RECOMMENDED:

[1] K. A. Navas, “*Electronics Lab Manual*”, Volume I, PHI, 5th Edition, 2015, ISBN: 9788120351424

[2] R.A Penfold, “*Electronic Projects in Workshop*”, Newnes Technical Books

[3] T.K Hamingway, “*Electronic Designer’s Handbook*”, Business Books Limited

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SER4S4	0	0	1	0	0	1	1
ENGINEERING ECONOMICS							
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

COURSE CONTENTS

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, and Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

- Upon completing the course, students will be able to:
- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.
- Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

BOOKS RECOMMENDED:

[1] C S Park, “*Contemporary Engineering Economics*”, Pearson Education, 2002.

[2] J S Chandan, “*Statistics for Business and Economics*”, Vikas Publishing.

[3] H. L. Ahuja, “*Principles of Microeconomics*”, S. Chand (G/L) & Company Ltd, 2002.

[4] D. N. Dwivedi, “*Macroeconomics Theory and Policy*”, Tata McGraw-Hill Publishing Company, 2010.

[5] S Damodaran, “*Managerial Economics*”, Oxford University Press, 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2SS057 Engineering Economics		L	T	P		T H	C W	S W	P R	Tota l
		2	-	-	Ma x	-	50	-	-	50
Duration of Theory Paper: Only Internal Tests					Min	-	25	-	-	25

Course Objective: To make fundamentally strong base for decision making skills by applying the concepts of economics and accounting to cope up with the current dynamic business environment

Prerequisites: Nil

COURSE OF CONTENTS

Unit-I

Engineering Economics

Economic Decision: Role of Engineering in Business; Concept, Nature and Scope of Economics & Business Economics; Types of Business Organizations.

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-II

National Income

Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-III

Consumer Demand

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-IV

Production Supply

Production Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-V

Liberalization

~~Liberalization, Globalization & Privatization: Concept & Characteristics; Evaluation of New Liberal Economic, Policy of India; Economy through Globalization.~~

BOOKS RECOMMENDED

[1] C S Park, *Contemporary Engineering Economics*, Pearson Education, 2002

[2] J S Chandan, *Statistics for Business and Economics*,

[3] C Dislis, JH Dick, I D Dear & AP Ambler, *Test Economics and Design for Testability*,

[4] S Damodaran, *Managerial Economics*,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5C1	L	T	P	L	T	P	Total
Object Oriented Programming	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: To learn about object oriented concepts through Java programming.

Prerequisites (if any): basics of computer programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming:

Object oriented concepts, Need for object oriented programming, Principles of object oriented programming- Abstraction, Encapsulation, Polymorphism, Inheritance; Procedural language vs OOPs, Salient features of Java, Development of Java programming, Access modifiers, Introduction to object model, concept of object initialization, simple Java program structure,

UNIT-II

Introduction to Java classes and objects

Java data types, data type conversions and type casting, operators and their precedence, Types of operators, conditional statements- if—else, switch case, ternary operator, Iteration statements- for loop, while expression, do-while, branching mechanism, introduction to classes-class members and member functions, constructors, constructor overloading, String handling, wrapper classes, Arrays and vectors.

UNIT-III

Inheritance and Polymorphism

Inheritance basics, Types of inheritance, merits and demerits, application of keyword Super, method overriding and overloading, Inhibiting inheritance of class using Final, Dynamic method dispatch, runtime polymorphism, abstract classes, Interfaces, implementing interfaces, Packages in Java, importing packages and classes into programs, user defined packages

UNIT-IV

Exception handling and Multi-threading

Introduction to exceptions, need for exceptions, exception handling techniques, exception types, Using try-catch, finally, throw and throws keywords, user defined exceptions, Multi-threading in Java, Thread class, the Main Thread, creation of new Threads, Thread states, Thread priority, Thread synchronization.

UNIT-V

Java I/O, Applets and Event Handling

Basic I/O classes, byte streams and character streams, class File, reading and writing Bytes, Applet basics, Applet architecture, Applet class and methods, Applet life cycle, event handling in Java, Delegation event model, types and sources of events, event listeners.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Understand the basic concepts of Java programming
- familiarize with the declaration of classes, arrays, operations with arrays, process of inheritance.
- Learn the implementation of interfaces, importing packages, handling exceptions and creating applets.
- learn how to write, compile and get results of simple application programs in Java

BOOKS RECOMMENDED:

- [1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.
- [2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [4] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

List of Practical Assignments:

1. Write a program that converts inches to centimeters.
2. Write a program in which the program gives output numbers 1 to 10 along with their square roots.
3. Write a program to find the average of five double numbers.
4. Write a program to determine the area of a sector of circle of radius r and angle subtended by the sector at the centre, a. The values of these variables are entered by the user.
5. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.

6. Write a program in which a sample of 8 random numbers is generated and an average value is determined by the user.
7. *Make a program which uses a for loop to calculate and display squares and cubes of numbers from 1 to 8.*
8. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
9. Write a program in which a sample of 8 random numbers is generated and an average value is determined.
10. Write a program in which a class is declared to deal with the characteristics of regular polygons and declare methods for determining area and perimeter. The length of the side and number of sides are declared public.
11. Write a program in which a method is declared to determine volume of a box with length, width and height as variables. The arguments should be passed on by reference.
12. Create a class Circle. Write a program to calculate:
 - (i) CircumCircle() - to compute the circumference of a circle.
 - (ii) ArcLenght – to compute the length of the arc for a given angle.
13. Within the main method of the class Circle, create an object of the class Circle. Compute Circle's circumference when the radius is 10 and arc lenght when the angle is 45.
14. Write an applet program to display strings in different colors that declares an array of type double and finds out the square roots of the array elements.
15. Write a program to demonstrate the multiplication of two matrices.
16. Write a program in which method overriding is implemented. The super class declares two instance variables i.e. radius and height, and define a method to determine the volume. The sub class determines the volume of cone and cylinder.
17. Make program to determine the trigonometric functions sin(), cos() and tan() by using methods of Math class for angles 30, 60, and 90 degrees.
18. Declare an interface with a method to calculate volume with one double parameter. Implement the same for finding volume of sphere and volume of a cube.
19. Make an applet program to display strings in different colors.
20. Make an applet program to draw a filled hexagon in orange color.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) VI Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
3EI353 Object Oriented Systems		L	T	P		T H	C W	S W	P R	Total
		4	-	2	Max	10 0	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: To familiarize with the Object oriented concepts through Java programming.

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Introduction to Object Oriented Programming:

Object Oriented Concepts, ~~Merits of Object Oriented Technology.~~ Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

Unit-II

Introduction to Java classes and objects:

Java features: ~~Java syntax,~~ data types, data type conversions, ~~control statements,~~ operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

Unit-III

Inheritance and Polymorphism :

Class relationships: Inheritance and its types, Merits and Demerits. ~~Association. Association inheritance,~~ Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

Unit-IV

Exception Handling and Multithreading:

Exceptions: Need for exceptions, ~~Checked Vs Unchecked exceptions,~~ creating exceptions. Multithreading: ~~Introduction, Priorities and scheduling,~~ Thread Synchronization and its life cycle.

Unit-V

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. ~~File handling, Applet and its Life Cycle, Basic GUI elements~~, Event Delegation Model and event handling

BOOKS RECOMMENDED

- [1] Cay S.Horstmann, *Core JAVA Vol-1*, 8/E Pearson Education, 2008.
- [2] Herbert Schildt, *The complete Reference*, 5/E Tata McGraw Hill, 2002.
- [3] Scott W Amber, *The Object Primer*,3/E Cambridge, 2005.
- [4] Timothy, Budd, *Object Oriented Programming*, 3/E Pearson Education, 2002.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, Oreilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5C2 Analog & Digital Communication	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- The course contents are aimed to provide the basics of signals and linear time invariant systems used in communication systems
- To review the basic Fourier techniques and its application in these processes.
- To provide knowledge of basic principles of analog and digital communication.
- To introduce the various processes like sampling, digital coding techniques, modulation and channel coding techniques that are used in modern telecommunication system.

Prerequisites: The basic knowledge of signals and systems and probability theory.

COURSE CONTENTS

UNIT-I

Signals and Systems: Types of signals-deterministic & random, periodic & non-periodic, analog & discrete, energy & power signals, Fourier series, Fourier transform & its properties, convolution, signal transmission through LTI systems, auto correlation, cross correlation, energy and power spectral density, their relationship with correlation function, probability, random variables & their moments, Gaussian probability density functions, its mean and variance.

UNIT-II

Amplitude Modulation: need of modulation in a communication system, block schematic of a typical communication system, AM modulation system, modulation index, generation (square law & switching modulator) & detection (envelope & square law detector) of AM wave, side bands & power content in an AM wave, a brief review of DSB-SC, SSB, VSB, AM transmitter block diagram, super heterodyne radio receivers and its advantages.

UNIT-III

Frequency Modulation: relationships between phase & frequency modulation, narrowband FM, wide band FM & their spectrum, transmission bandwidth of FM and PM signals, FM generation methods (direct & indirect) & FM detection methods (discriminators: balanced, phase shift and PLL detector), pre-emphasis & de-emphasis, FM transmitters, FM receivers (block diagram), comparison with AM systems in presence of noise, frequency division multiplexing.

UNIT-IV

Sampling, Digital encoding & Line coding: sampling theorem, types of sampling, quantization, digital encoding techniques PCM, DPCM, DM, ADM, line coding techniques NRZ, RZ, Biphase, Duo Binary, their comparison based on various desirable properties.

UNIT-V

Digital modulation & Channel coding: A brief overview of generation, detection, constellation points of digital modulation techniques, ASK, FSK, PSK, MSK, introduction to optimum filter, matched filter. Channel coding techniques: error detection and correction codes, parity check code, minimum distance, hamming distance, **overview of linear block code, cyclic code, convolutional code and their applications.**

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand basics of signals, frequency domain analysis & its importance.
- Understand the working of transmitter and receiver in analog & digital communication system.
- Understand about the digital data transmission using line coding.
- Understand how to detect and correct the errors introduced during the transmission.

BOOKS RECOMMENDED:

- [1] Lathi B.P., *Analog and Digital Communication Systems*, 3/e, Oxford Press, 2007
- [2] Proakis and Salehi, *Fundamentals of Communication Systems*, Pearson Education, 2005
- [3] Taub & Schilling, *Principles of Communication Systems*, 4/e, McGraw Hill, 2013
- [4] Bernard Sklar, *Digital communication*, 2/e, Pearson Education, 2007.
- [5] Haykins Simon, *Analog and Digital Communication*, 3/e Willey Publication, 2007.
- [6] Singh R.P. & Sapre, *Communication systems Analog & Digital*, TMH, 2007
- [7] Carlson, *Communication Systems*, McGraw Hill, 2004

List of Practical Assignments:

1. To study the working of sampling and reconstruction techniques for various sampling frequencies.
 2. To study even/odd parity check code for single bit error detection.
 3. To perform time division multiplexing and de- multiplexing.
 4. Study and analysis of pulse code modulation and demodulation.
 5. To study various data formatting schemes (unipolar, polar, AMI etc.).
 6. Study and analysis of amplitude modulation & demodulation for different modulation index values.
 7. Study and analysis of frequency modulation and demodulation.
 8. Study and analysis of ASK modulation and demodulation.
 9. Study and analysis of BPSK modulation and demodulation.
- Study and analysis of QPSK modulation and demodulation.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) V Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3EI302 Analog & Digital Communication	L	T	P		T H	C W	S W	P R	Total
		4	-	2	Ma x	10 0	50	50	50
Duration of paper: 3 hrs				Mi n	35	25	25	25	110

Course Objectives : The course contents are aimed to provide the basics of signals and linear time invariant systems used in communication systems. and Knowledge of different types of analog and digital communication system, different modulation techniques used in these systems.

Prerequisite(s): The basic knowledge of Probability Theory.

Unit I

Signals and Systems: Types of Signals- Deterministic & Random, Periodic & Non-Periodic, Analog & Discrete, Energy & Power Signals. Classification of Systems, Fourier series, Fourier Transform & Its Properties, Convolution, Signal Transmission Through LTI Systems, Auto Correlation, Cross Correlation, Energy and Power Spectral Density, their relationship with Correlation function.

Probability, Random Variables & Their Moments, Gaussian Probability Density Functions, its Mean and Variance.

Unit II

Amplitude Modulation: Need of Modulation in a Communication System, Block Schematic of a Typical Communication System. AM Modulation System, Modulation Index, Generation(Squire Law & Switching Modulator) & Detection (Envelope & Squire Law Detector) Of AM Wave , Side Bands & Power Content In An AM Wave, A brief review of DSB-SC,SSB, VSB. Comparison of various AM Systeys. AM Transmitter Block Diagram, Super Heterodyne Radio Receivers and its advantages.

Unit III

Frequency Modulation: Relationships Between Phase & Frequency Modulation, Narrowband FM, Wide Band FM & Their Spectrum, Transmission Bandwidth Of FM And PM Signals, Constant Bandwidth Characteristics Of FM, Overview of Methods of Generation(Direct & Indirect) & Detection Of FM(Discriminators : Balanced, Phase Shift And PLL Detector), Pre-Emphasis & De-Emphasis, FM Transmitters, FM Receivers(Block diagram).

Unit IV

Sampling & Quantization: Sampling theorem, Types of Sampling, Digital Encoding Techniques, Quantization, Quantization Noise PCM, DPCM, DM, ADM, , Line Coding

Techniques NRZ, RZ, Biphasic, Duo Binary Etc., Their Comparison based on various desirable properties.

Unit V

A brief Overview of Generation, Detection, Band Width requirement, Constellation Points of Digital Modulation Techniques :ASK, FSK Binary PSK, QPSK, M-Ary FSK, MSK Introduction to Optimum Filter, Matched Filter.

Channel Coding Techniques: Error Detection and Correction Codes, Parity Check Codes, Minimum Distance, Hamming Distance, Error Correction and Detection Capability.

References:

- [1] Proakis and Salehi, *Fundamentals of Communication Systems*, Pearson Education, 2005
- [2] Lathi B.P., *Analog And Digital Communication systems*, Oxford Press, 2007
- [3] Singh R.P. & Sapre, *Communication systems Analog & Digital*, TMH, 2007
- [4] Haykin Simon, *Communication Systems*, John Willey & Sons, 2006
- [5] Carlson , *Communication Systems*, McGraw Hill,2004
- [6] Taub & Schilling, *Principles of Communication Systems*, 3/E,McGraw Hill,,2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (E&I)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR5C3 Power Electronics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To prepare the students to analyze & design different power converter circuits.
- To acquire knowledge about various application of power electronics.

Prerequisites: Basic Electronics

COURSE CONTENTS

UNIT-I

Static Power Devices

Power semiconductor diodes & transistors, Thyristors, Construction, Characteristics, Ratings, Protection, Heating, Cooling, Mounting, Turn on methods, Gate characteristics, Firing circuits of thyristor, Introduction to other members of thyristor family like PUT, SUS, SCS, DIAC, TRIAC.

UNIT-II

Converters

Thyristor commutation techniques, Phase controlled rectifiers, Principal of phase control, Full wave controlled converters, Single-phase full wave converters, Three-phase thyristor converter circuits, Basic principle & power circuit of Dual converter & AC voltage controller.

UNIT-III

DC to DC Converter

Choppers: Basic principal of chopper operation, Control strategies, Step-up chopper, Different types of chopper circuits, Thyristor chopper circuits, Performance analysis.

UNIT-IV

Inverter

Single-Phase voltage source inverters, Principal of operation, Fourier analysis of single-phase inverters, Force-commutated thyristor inverters, Current source inverters, Pulse-width Modulated Inverters.

UNIT-V:

Industrial application of Power Electronics, SMPS, UPS, static switches, circuit breakers, solid state relays, concept of Electric drive.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Design the Inverter, chopper, rectifiers for high voltage.
- Apply design concepts for industrial applications.

BOOKS RECOMMENDED:

[1] Muhammad H. Rashid, *Power Electronics Circuits, Devices & Applications*, 3/e. 2004, PHI

[2] Cyril W. Lander, *Power Electronics*, 3/e.1993, The McGraw-Hill

[3] Dr. P.S. Bimbhra, *Power Electronics*, 4/e. 2006, Khanna Publishers

[4] P.C. Sen, *Power Electronics*,

[5] Ned Mohan, *Power Electronics, Converters, Application & Design*, 2/e. 1995, John Wiley

[6] Joseph Vithayathil, *Power Electronics, Principles & Applications*, 6/e. 2010, McGraw Hill

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per Week			Marks					
4EI352 Power Electronics	L	T	P		T H	C W	S W	P R	Total
	4	-	2	Ma x	10 0	50	50	50	250
Duration of paper: 3 hrs				Mi n	35	25	25	25	110

Course Objective: Advancements in semiconductor devices creates a revolution in power transmission, distribution and utilization, This course helps students to understand the basic concepts of power semiconductor devices which make students to analyze and design switch mode power electronic converters for various applications including microprocessor power supplies, renewable energy systems, and motor drives.

Prerequisite: Basic Electronics.

COURSE OF CONTENTS

Unit I

power semiconductor diodes and Transistors , Thyristors, Characteristic ,turn on methods ,Switching ,Gate Characteristic , Ratings, Introduction to other member of Thyristors family like PUT, SUS, SCS, SITHs, Diac, Triac, ~~RCT, GTO, Firing Circuits of Thyristors, Pulse Transformer in firing circuits, Triac Firing circuit.~~

Unit II

Thyristors Commutation techniques, Phase Control Rectifiers, Principal of phase Control , Full-wave controlled Converters, Single-Phase Full-wave Converters, ~~Single-Phase Two-pulse Converters with Discontinuous Load Current,~~ Three Phase- Thyristors Converters circuits, ~~Dual Converters, Types of AC voltage controllers, Integral Cycle Control, Single-phase Voltage Controllers,~~ sequence control of AC voltage controllers

Unit III

Choppers: Principle of Chopper Operation, Control Strategies, Step-up/down Choppers, Different types of Choppers circuits, Thyristors Chopper circuit. ~~Inverters: Single-phase voltage source inverters, Fourier Analysis of Single-phase Inverters, Force commutated Thyristors Inverters, Three Phase Bridge Inverters, Voltage Control in Single-phase Inverters, Pulse-width Modulated Inverters.~~

Unit IV

Principle of Cycloconverter, ~~Three Phase Half wave Cycloconverter, Output voltage equation for a Cycloconverter. SMPS, UPS, HVDC transmission, Static Switches, Circuit Breakers, Solid State Relays, Resonant Converters~~

Unit V

~~Concepts of Electric drive, DC drive, Choppers drives, AC drives, Induction Motor Drives, Speed control of Three Phase induction Motors, Synchronous Motor Drives,~~

References:

- [1] .Muhamed H.Rashid, *Power Electronics Circuits, Devices and Applications*, 3/e. 2004, PHI.
- [2]. Singh and Kanchandani, *Power Electronics*, TMH
- [3] .Sen, *Power Electronics*, TMH,
- [4]. Dubey, *Thyristorised power controllers*, Wiley Eastern
- [5]. Vithayathil, *Power Electronics – Principles and applications* McGraw-Hill.
- [6]. Lander, *Power Electronics*, 3/e, McGraw-Hill.
- [7]. Dr.P.S.Bimbhra, *Power Electronics*, 3/e, Khanna Publishers, New Delhi

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5E1 Microcontroller	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Prerequisite: Students should have in depth knowledge of Digital Logic Design, Microprocessor architecture as well as logical ability and programming skills to develop the code

Rationale: The knowledge of microcontroller is very essential for a student of BE in Electronics and Communication/instrumentation Engineering as the world is migrating towards automation rapidly in each and every fields. The students studying the subject are supposed to learn the architecture and programming of typical microcontroller. Students will be taught the basic use of an assembly as well as embedded C programming environment to control peripheral devices. Students will also understand the interfacing of various peripheral elements with microcontroller to design an automated system. The course will cover AVR, 8-bit Microcontroller in detail with sufficient exposure to design an automated system.

Unit 1: Introduction To Microcontroller

Microcontrollers and Embedded processors, Microcontroller survey, Overview of AVR family, AVR Microcontroller architecture, Register, status register, ROM space and other hardware modules, ATmega32 pin configuration & function of each pin.

Unit 2: AVR Assembly Language Programming

Addressing modes of AVR, Different instructions, assembly language programs, I/O Port Programming, Time delay loop, BCD, ASCII conversion Program, Look-up table, Bit addressability, MACROS.

Unit 3: AVR Programming in C

Data types, I/O programming, logic operations, Intel HEX file, Timer programming in assembly and C, Input capture and Wave Generator, PWM programming

Unit 4 : Interrupt & Serial port programming

Interrupt environment ,Interrupt programming and applications, Serial Port programming and applications

Unit 5 : Peripheral Interfacing

LCD and Keyboard Interfacing, ADC, DAC and sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, DC motor control, SPI protocol and Display interfacing, I2C Protocol and RTC interfacing

Reference Books:

1. The AVR Microcontroller and Embedded Systems Using Assembly and C, By Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, Pearson Education.
2. Programming and Customizing the AVR Microcontroller, By Dhananjay Gadre, McGraw Hill Education
3. AVR ATmega32 data sheet

Course Outcome:

After learning the course the students should be able to:

1. Understand the architecture of AVR 8-bit Microcontroller.
2. Describe the importance and function of each pin of AVR ATmega32 Microcontroller.
3. Write, debug and simulate assembly as well as embedded C language programs.
4. Understand Timer operation, Interrupt environment and Serial Communication.
5. Interface I/O peripheral devices with microcontroller.
6. Summarize the functionality of I2C and SPI protocol.

List of Open Source Software/learning website:

1. Open source AVR simulator.
2. www.atmel.com
3. <http://www.arduino.cc/>

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) V Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3EI304 Microcontrollers	L	T	P		T H	C W	S W	P R	Total
	4	-	2	Ma x	10 0	50	50	50	250
Duration of paper: 3 hrs				Mi n	35	25	25	25	110

Course Objectives: Fundamentals of microcontrollers, Study of 8051 microcontroller, interfacing of various peripherals to microcontroller, building to embedded system.

Prerequisite(s): Fundamental knowledge of Digital Electronics, Microprocessor hardware and Assembly Language Programming.

COURSE OF CONTENTS

Unit I

The 8051 architecture

~~Microprocessor and Microcontroller, Comparison of microprocessors and microcontrollers
Microcontroller survey—microcontrollers of different word length, make and features, selection
criteria for microcontroller, 8051 microcontroller hardware— I/O pins and internal architecture
Internal RAM, ROM organization, I/O port circuits, connecting external memory~~

Unit II

Assembly Language Programming

~~Addressing modes, data transfer, arithmetic, logical, branch transfer, stack and bit related
instructions
Programming 8051 for basic operations, connecting 8255, Programming tools and techniques~~

Unit III

Interrupts

~~Timer interrupt, serial port interrupt, external interrupt, reset, interrupt control, interrupt
priority
Interrupt destinations, software generated interrupts, connecting A/D and D/A, application
programs using interrupt~~

Unit IV

Counter and timers

~~Timer modes of operation, timer counter interrupt, counter, serial data transmission, reception,
Serial data transmission modes, programming based on timer application and serial
transmission~~

Unit V

Interfacing and applications

~~Scanning programs for small keyboards ,interrupt driven programs ,program for matrix keyboard~~

~~LCD display ,frequency measurement ,pulse measurement ,multiple interrupts, measurement and control of physical parameter as temperature ,stepper motor control~~

BOOKS RECOMMENDED

[1] Mazidi, McKinley, *The 8051 Microcontroller & Embedded system Using Assembly and C*, 2/E Pearson

Education, 2006.

[2] Kenneth J.Ayala, *The 8051 Microcontroller*, 3/E Penram International, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
Digital Signal Processing (EIR5G3)	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4

Learning Objectives: To provide the analysis techniques like for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Prerequisite(s): Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

Unit-I

Introduction to signal processing , Discrete time signals and sequence operations , Discrete time systems properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system .Frequency domain representation of discrete time signals and systems(DTFT), properties,Representation of sequences by Fourier transforms.

Unit-II

Introduction to Z- transforms , properties , Inverse Z – transform, ,block diagram representation of linear constant coefficient difference equation,Signal flow graph representation of LCCDE, Basic structures for IIR systems ,Basic structures for FIR systems. Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals, properties,circular convolution ,linear convolution using DFT, Implementing LTIV systems using DFT.

Unit-III

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms.

Unit IV

Filter design techniques ,Design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing properties of commonly used windows.

Unit V

Introduction of DSP Processor.Types of Digital signal processors , Applications.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

+

1. Understand the concept of Fourier transform & Fourier series.
2. Acquire knowledge and understanding of filter design.
3. Able to know the functioning of DSP processors.

BOOKS RECOMMENDED

- [1] Oppenheim and Schaffer, Discrete time signal processing, 2/E PHI, 2005.
- [2] Proakis and Manolakis, Discrete time signal processing, PHI, 2005.
- [3] S. Mitra, Discrete time signal processing, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) VI Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		T H	C W	S W	P R	Total
3EI354 Digital Signal Processing	4	-	-	Ma x	10 0	50	-	-	150
	Duration of paper: 3 hrs			Mi n	35	25	-	-	60

Objectives: To provide the analysis techniques like for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Prerequisite(s): Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

Unit-I

Introduction to signal processing , Discrete time signals and sequence operations ,properties . Discrete time systems ,their properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system ,Linear constant coefficient difference equations and their solutions .,MATLAB exercises

Unit-II

Frequency domain representation of discrete time signals and systems ,suddenly applied complex exponentials inputs , representation of sequences by Fourier transforms , conditions of their convergence ,symmetry properties of the FT, Fourier transform theorems, MATLAB exercises

Unit-III

Introduction to Z- transforms , ROC and their properties , Inverse Z – transform, Z-transform properties ,Initial value theorem ,structures for discrete time systems ,block diagram representation of linear constant coefficient difference equations , Direct form I,II . signal flow graph representation of LCCDE, basic structures for IIR systems , direct forms,cascade,parallel forms ,transposed forms ,basic structures for FIR systems ,Direct form , cascade form structures for linear phase FIR systems, MATLAB exercises

Unit-IV

Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals ,sampling the FT, Fourier representation of finite duration sequences , the discrete Fourier transform ,properties of DFT ,symmetry properties ,circular

convolution ,linear convolution using DFT, Implementing LTIV systems using DFT, ~~MATLAB exercises~~

Unit-V

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms. Filter design techniques ,design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing ,properties of commonly used windows, ~~MATLAB exercises~~

BOOKS RECOMMENDED

- [1] Oppenheim and Schafer, *Discrete time signal processin*, 2/E PHI, 2005.
- [2] Proakis and Manolakis, *Discrete time signal processing*, PHI, 2005.
- [3] S. Mitra, *Discrete time signal processing*, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) V Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS306 Principles of Management	L	T	P		TH	CW	SW	PR	Total
	2	-	-	Max	-	50	-	-	50
Duration of paper: 3 hrs				Min	-	25	-	-	25

Objectives: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Principles & Functions of Management.

Prerequisite(s): -Basic knowledge of principle of management.

COURSE OF CONTENTS

Unit I

The Nature of Management:

Definition and role of management; the function of a manager, Scientific management. Various schools of management thought. The Functions & Principles of management.

Unit II

Planning:

Nature and purpose of planning, Components of planning objective of business.

Unit III

Organization:

Nature and purpose of organizing Structure, Centralization, Decentralization, Span of control, Delegation of authority relationship. Formal and informal organization.

Unit IV

Directions & Staffing:

Direction process, Theories of motivation and leadership, Need analysis, Communication.

Unit V

Control:

Meaning and process of control, techniques of control evaluation, developing and compensating the employees, Merit rating.

BOOKS RECOMMENDED:

- [1] Koontz and O'Donnel, *Essentials of Management*, 6/E TMH Jan, 1986
- [2] R.D Agrawal, *Organization & Management*, 1/E PHI, 1997
- [3] Peter Drucker, *Practice of Management*, 1992
- [4] Mc Farland, *Management, Principal and Practice*.
- [5] L.M Prasad, *Principal and Practice & Mgt*.
- [6] T.N Chhabra, *Principal and Practice & Mgt*, 1/E
- [7] G.R Terry, *Principal of Management's*.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) V Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS306 Principles of Management	L	T	P		TH	CW	SW	PR	Total
	2	-	-	Max	-	50	-	-	50
Duration of paper: 3 hrs				Min	-	25	-	-	25

Objectives: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Principles & Functions of Management.

Prerequisite(s): -Basic knowledge of principle of management.

COURSE OF CONTENTS

Unit I

The Nature of Management:

Definition and role of management; the function of a manager, Scientific management. Various schools of management thought. The Functions & Principles of management.

Unit II

Planning:

Nature and purpose of planning, Components of planning objective of business.

Unit III

Organization:

Nature and purpose of organizing Structure, Centralization, Decentralization, Span of control, Delegation of authority relationship. Formal and informal organization.

Unit IV

Directions & Staffing:

Direction process, Theories of motivation and leadership, Need analysis, Communication.

Unit V

Control:

Meaning and process of control, techniques of control evaluation,

BOOKS RECOMMENDED:

- [1] Koontz and O'Donnel, *Essentials of Management*, 6/E TMH Jan, 1986
- [2] R.D Agrawal, *Organization & Management.1/E PHI*, 1997
- [3] PeterDrucker, *Practice of Management*, 1992
- [4].Mc Farland, *Management, Principal and Practice.*
- [5] L.M Prasad, *Principal and Practice & Mgt.*
- [6] T.N Chhabra, *Principal and Practice & Mgt,1/E*
- [7] G.R Terry, *Principal of Management's.*

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR5L3 Software Workshop	L	T	P	L	T	P	Total
Only Practical examination will be held	-	-	2	-	-	2	2

Learning Objective: To familiarize students about Java based application programs

Prerequisites (if any): basics of Java programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming, Java based application programs related to topics such as conditional statements, iteration statements with a focus on problems related to electronics and telecommunication.

UNIT-II

Introduction to string handling, Arrays, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-III

Introduction to Inheritance and Polymorphism, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-IV

Exception handling and Multi-threading, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-V

Java I/O, Applets and Event Handling, creating GUIs in AWT windows, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Write Java based application programs
- Learn to apply the concepts relating to various topics

BOOKS RECOMMENDED:

[1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.

[2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.

[3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.

[4] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year BE Branch Electronic & Telecommunication / Electronics & Instrumentation						
Subject Code & Name		Instructions Hours per Week			Marks					
EIR6C1 : VLSI Design		L	T	P		TH	CW			Total
Duration of paper: 3 hrs		3	1	----	Max	60	40	--	--	
					Min					

Course Objective: This course presents the fundamental of Digital CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite: Knowledge of Digital Circuit and Basics of Semiconductors is required.

COURSE OF CONTENTS

Unit I

VLSI design flow, VLSI design style, introduction to the basic fabrication processes (wafer preparation, oxidation, diffusion, etching, metallization and lithography, etc.), Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor.

Unit II

Threshold voltage equation and energy band diagram of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances. Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter

Unit III

Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation. Limitations of CMOS in NANO scale circuit design.

Unit IV

CMOS logic, Complex Logic Circuits, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit using CMOS and analysis of various design parameters.

Unit V

Sequential MOS Logic circuits , SR Latched circuits, clocked latch and Flip Flop Circuits, CMOS D latch and Edge Triggered Flip Flop, Design of the Schmitt trigger circuit, Dynamic random access and Static random access memory cell design and analysis, Sense amplifier and row and column decoder circuit.

Learning outcomes:

1. Design building blocks of digital IC using Gate level Modeling.
2. Design building blocks of digital IC using Dataflow Modeling.
3. Design stimulus blocks to test the functionality of the designs.

References:

- [1]. Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, Tata McGraw-Hill, 3/e.
- [2]. R. Jacob Baker, Harry W. Li and David E. Boyce, *CMOS Circuit design, layout and Simulation*, PHI,IEEE press, Series Edition,
- [3]. Yuan Taur and Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Cambridge university Press, Special Edition, 1998
- [4]. Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, PHI, 2/e
- [5]. Jan M. Rabaey, *Digital Integrated Circuit*, PHI, 2/e

Scheme CBCS for B.E. III (Electronics & Telecommunication/ Electronics & Instrumentation)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per Week			Marks					
4EI353 IC Design Techniques	L	T	P		T H	C W	S W	P R	Total
	Duration of paper: 3 hrs	4	-	2	Ma x Mi n	10 0 35	50 25	50 25	50 25

Course Objective: This course presents the fundamental of analog and Digital CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite: Knowledge of semiconductor devices is required.

COURSE OF CONTENTS

Unit I

VLSI design flow, VLSI design style, introduction to the basic fabrication processes (wafer preparation, oxidation, diffusion, etching, metallization and lithography, etc.), Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor.

Unit II

Threshold voltage equation and energy band diagram of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ration, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances

Unit III

Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

Unit IV

CMOS logic, pseudo NMOS logic, passes transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, ~~sequential logic circuit design and semiconductor memory circuit.~~

Unit V

Basic concept of analog VLSI design, Common source stage, source follower, single ended and differential operation, common mode response, active current mirror, frequency response of amplifier, introduction to the operational amplifier.

References:

- [1].Sung-mo Kang, Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3/e, Tata McGrawHill.
- [2].Behzad razavi, *Design of Analog CMOS Integrated Circuit*, Tata McGraw Hill, 11th reprint, 2006.
- [3].R. Jacob Baker, Harry W. Li & David E. Boyce, *CMOS Circuit design, layout and Simulation*, PHI,IEEE press, Series Edition,
- [4].Yuan Taur, Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Cambridge University Press, Special Edition, 1998
- [5].Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, 2/e ,PHI
- [6]. Jan M. Rabaey, *Digital Integrated Circuit*, 2/e,PHI

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. Medical & Analytical Instrumentation			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR6C2 Medical & Analytical Instrumentation	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To understand the linkage between Medical Science & Engineering.

Prerequisites: Knowledge of Basic Electronics and Fundamentals of biology & chemistry.

COURSE CONTENTS

UNIT-I

Sources of biomedical signals, Medical instrumentation system, General constraints in design of medical instrumentation system, Patient safety, Electric shock hazards, Effects of electric current on human body, Precautions to minimize electric shock hazards, Leakage current & its types, Testing of biomedical equipment.

UNIT-II

Origin & types of bioelectric signals, Electrodes used for ECG, EEG, EMG, Electrical conductivity of electrode jellies & cream, Microelectrodes, Biomedical recorders: ECG, EEG, EMG, PCG, VCG, Lasers used in medical field, Bedside patient monitoring system, Biomedical telemetry & Telemedicine.

UNIT-III

X-ray machine & Digital radiography, Principles & system components of Computed-Tomography, Magnetic Resonance Imaging: Principles of NMR, its Components & Biological effects, Ultrasonic & Thermal imaging systems.

UNIT-IV

Cardiac pacemaker like External, Implantable pacemaker, Artificial kidney, Dialyzers, Haemodialysis machine, Stone disease problem, Lithotripter system, Principle of surgical diathermy, Surgical diathermy machine, Electro-surgery techniques, Electrodes used with surgical diathermy, Introduction to Defibrillators, Mechanics of Respiration, Artificial ventilation, Types of ventilators.

UNIT-V

Fundamentals of analytical instruments, Electromagnetic radiation and its interaction with matter, Laws of spectroscopy, Various components of Absorption instruments, Ultraviolet & Visible absorption spectroscopy, Different types of Photometers and Spectrophotometers, Infrared & FTIR spectroscopy, Nuclear magnetic resonance spectroscopy: Principal & its types, Introduction to chromatography: Gas & Liquid, Computer-based analytical instruments.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the various sources of bioelectric signals & their processing.
- Describe the fundamentals of various recording & diagnostic instruments.
- Acquire & develop skills for preventive maintenance and repairing of medical instruments.
- Study & understand the fundamentals of medical & analytical laboratory instrumentation.

BOOKS RECOMMENDED:

- [1] R.S.Khandpur, *Handbook of Biomedical Instrumentation*, 2/e, Tata McGraw-Hill, 2007
- [2] John G. Webster, *Medical Instrumentation*, 4/e, Wiley, 2015
- [3] Carr Brown, *Introduction to Biomedical Equipment Technology*, 4/e, Pearson, 2007
- [4] R.S.Khandpur, *Handbook of Analytical Instruments*, 2/e, Tata McGraw-Hill, 2012
- [5] H.H Willard, *Instrumental Methods of Analysis*, 7/e, Publisher Name, 1988

List of Practical Assignments:

1. Study of ECG Simulator for understanding the ECG signal & its generation process.
2. Using ECG Amplifier & CRO measure the amplitude, frequency & nature of ECG signal.
3. Study of EEG Simulator for understanding the EEG signal & its generation process.
4. Using EEG Amplifier & CRO measure the amplitude, frequency & nature of EEG signal.
5. Study of EMG Simulator for understanding the EMG signal & its generation process.
6. Using EMG Amplifier & CRO measure the amplitude, frequency & nature of EMG signal.
7. Study of Heart & Pacemaker.
8. Study of Defibrillator system.
9. Study of Respiratory system.
10. Experimental study of ph meter & UV-Spectrophotometer.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
	L	T	P						
4EI303 Bio-Medical Instrumentation				Max	100	50	50	50	250
Duration of Theory Paper: hrs	4	-	2	Min	35	25	25	25	110

Course Objective: To encompass students for understand linkages between medical sciences and engineering techniques So that to have a fair views of physiological system of the body along with the instrumentation essential for the detection, acquisition and quantification of the bio signals.

Prerequisite: Basic course in sensors & transducers and biology

COURSE OF CONTENTS

Unit I

Basic Medical Instrumentation system, General Constraints in design of medical instrumentation system, Biomedical Telemetry ,Patient Safety, Laser used in Biomedical Fields, Automated Drug Delivery Systems

Unit-II

Fundamental of Medical instrumentation, Type of Bioelectrical Signals, electrodes used for ECG,EEG,EMG, microelectrodes, electrode jellies and cream, Transducers used for Displacements, position, motion, pressure, body temperature, optical fiber sensor, biosensors, smart sensors, Biomedical recorders like ECG,PCG,VCG,EEG,EMG.

Unit III

Oximeters like Ear, Pulse and intravascular oximeter, Ultrasonic, NMR, LASER Doppler blood flow meter, Cardiac output measurement techniques like Dye dilution, Thermal Dilution, Ultrasound Method, Pulmonary Function Analysers,Respiratory gas anlyzers,Blood pH,Blood pCO₂ measreument, Methods of Cell Counting, Pure tone, Speech Audiometers.

Unit IV

X-ray machines, Dental X-ray machines, Digital Radiography, Principles and, System components of Tomography, Principles of NMR, its components and biological effects. Ultrasonic & Thermal imaging systems.

Unit V

Cardiac Pacemakers like external, implantable pacemakers, implantable, DC, Pacer-cardioverter Defibrillators, Artificial Kidney, Dialyzers, Haemodialysis machine. Stone disease problem, lithotripter systems, ~~Anesthesia machine, Mechanism of artificial ventilation, Types of Ventilator~~

References:

- [1].Cromwell,Weibull & Pfeiffer,*Biomedical instrumentation and Measurements*,2/e,PHI New Delhi-1999
- [2].R.S.Khadpur,*Handbook of Biomedical Instrumentation*,2/e,TMH Pub.Company,New Delhi
- [3]. Nandini K. Jog, *Electronics in Medicine and Biomedical Instrumentation*, Prentice Hall
- [4] Dr. A. Arumugam ,*Biomedical Instrumentation*, , Anuradha Agencies, Chennai.
- [5] Domach,*Introduction to Biomedical Engineering*, Pearson Education
- [6] C Raja Rao & S.K Guha *Principles of Medical Electronics & Biomedical Instrumentation*, , University Press.
- [7] J.G. Webster,*Handbook of Medical Electronics*,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics & Instrumentation Engineering)				
Subject Code & Name		Instructions Hours per Week			Credits			
EIR6C3 Control System		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Learning Objectives:

- To provide the fundamental knowledge of control system engineering and the concept of mathematical modelling of the physical system.
- The subject gives various classical analysis tools for design and stability of system in time and frequency domain.

Prerequisites (if any): Knowledge of Laplace transforms, Z-transform, Basics of MATLAB & Simulink.

COURSE CONTENTS

UNIT-I: Introduction to the control system & Physical modelling

Basic component of control system (CS), open-loop CS (non-feedback system), close-loop CS (feedback CS), Types of feedback CS- linear and non-linear CS, time-invariant and time variant CS, single variable and multivariable control system.

Effect of feedback on-overall gain, stability, sensitivity, external disturbance or noise, Block diagram representation of CS, Block diagram reduction rules, Transfer function (TF), Poles-zero concept, Signal flow graph (SFG), Mason's gain formula.

Modeling of CS- electrical networks, mechanical systems-translational and rotational mechanical system, analogy concept- force to voltage (F-V) and force to current (F-I) analogy.

UNIT-II: Time domain analysis & Stability

Time response of continuous-data system, Standard test signals, Time response of prototype first and second order CS, Performance specifications of prototype I & II order systems, Steady-state errors and error constants (positional, velocity, acceleration), Effect of adding Poles and Zeroes to open-loop and close-loop transfer function (TF), Concept of Dominant poles of TF.

Types of controllers and their control action-proportional (P), integral (I), derivative (D), PID control, and derivative feedback control, MATLAB based problems.

Stability-Concept of stability, Necessary conditions for stability, Absolute and relative stability, Algebraic Criterion of stability- Routh Hurwitz Criterion. The Root locus concept, Guidelines for sketching Root-locus, Root contour.

UNIT-III: Stability and Frequency domain analysis of CS

Frequency domain analysis- Concept of complex frequency, performance specification of frequency domain, Co-relation between time & frequency domain, Polar plot, Bode plot, Stability analysis in frequency domain- Nyquist Criterion, Stability margins-Gain and Phase margin, MATLAB Based Problems.

UNIT-IV: Design of Feedback CS & State Space Analysis of CS

Approach to system design, Preliminary considerations classical design, Realization of basic Compensators-Lead, Lag, and Lag-lead compensator, Design of compensators in Time and Frequency domain.

Concept of State, State Variable, and State Model, State model representation of an LTI system, co-relation between State Model and TF, Solution of State Equations, Transfer Matrix, Concept of Controllability & Observability, MATLAB based problems.

UNIT-V Digital Control Systems

Block diagram representation of Digital Control System, Sampling process, Mathematical analysis of sampling process, Reconstruction of sampled signal, Pulse Transfer Function, Zero-order and first order hold circuit, Mapping of s-plane to z-plane.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the concept of LTI control systems, Importance of feedback in CS and stability concept.
- Able to Design a Stable Control System
- Understand the difference between Linear and Digital Control Systems.

BOOKS RECOMMENDED:

[1] B.C. Kuo, *Automatic Control System*, 7/E, PHI, 2006.

[2] I. J. Nagrath and M. Gopal, *Control Systems Engineering*, 5/E, New Age International Publishers, 2007.

[3] M. Gopal, *Control Systems (Principles & Design)*, 5/E, Tata McGraw Hill, 2007.

[4] Bishop & Dorf, *Modern Control System*, Addison Welseley.

[5] Ogata, *Discrete-Time Control System*, 2/e, PHI, 1995.

List of Practical Assignments:

1. Find the transfer function of various LTI control systems (open loop and close loop) using MATLAB command.

2. Write a program to plot the poles and zeroes for the different sets of transfer function using MATLAB.
3. Write a program to plot the time response of first and second order control system on impulse, unit-step, ramp and parabolic input signals using MATLAB. Also find the value of various transient response parameters.
4. To determine the position, velocity and acceleration error coefficient of given transfer functions using MATLAB.
5. Plot the root locus for various transfer functions using MATLAB command.
6. Plot the Nyquist plot for the given transfer function using MATLAB. Also comment on the systems stability.
7. Plot the Bode plot for the transfer function given below by using MATLAB.

$$G(s)H(s) = \frac{2(s+0.25)}{s^2 (s+1) (s+0.5)}$$

Also find (a) Phase cross over frequency (b) Gain cross over frequency
 (c) Gain margin (d) Phase margin.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) VI Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		T H	C W	S W	P R	Total
3EI355 Control Systems	4	-	2	Ma x	10 0	50	50	50	250
	Duration of paper: 3 hrs			Mi n	35	25	25	25	110

Objective: Is to provide fundamentals of control engineering & the concept of mathematical modeling of the physical system. The subject gives various classical analysis tools for design & stability the systems in time domain & frequency domain.

Prerequisites: Knowledge of Laplace transforms, Basics of Matlab & Simulink

COURSE OF CONTENTS

Unit I

Introduction to the Control System & Modeling

Block diagram, open loop & close loop system, Servomechanism, Feed forward & Feed back control, Digital Control, Multivariable Control System, Non-Linear Control System. Modeling of Physical Systems, Linear Approximations of Physical Systems, The transfer function, Block Diagram algebra, Signal Flow graphs, Mason's Gain Formula, A.C.& D.C Servomotors, Synchros, Pneumatic & Hydraulic devices for control, Analog computer simulation

Unit II

Time Domain Analysis & Stability

Effect of using feedback, Sensitivity of control systems, Test signals, Time response of prototype First & second order system, Performance specifications of the prototype I & II order system, Effects of additions of poles and zeros to open loop & close loop transfer functions, time response of higher order s, stems & concept of dominant pole, Steady-state error & error constants, Types of controllers & their control action, Stability : BIBO & Zero input, Absolute & relative, Routh Hurwitz criterion, The Root-locus concept, Guidelines for sketching Root-locus, Root contours, Root-locus of systems with Dead time, MATLAB based problems.

Unit III

Frequency Domain Analysis of Control System

Cocept of complex frequency, Performance specification in frequency domain, Co-relation between frequency domain & time domain, Principal of argument, Polar plots, Bode plots, Nicholas Charts, Stability Analysis in Frequency Domain, Nyquist Criteria, stability margins, Relative stability , Systems with dead time, MATLAB based problems.

Unit IV

Design of feedback control systems

Approaches to system design, Cascade compensation networks, Design of Compensators in Time & Frequency domain, MATLAB based problems.

Unit V

State Variable Techniques

~~State variable representation for an LTI system, Different Canonical forms, Co-relation between state models & Transfer function, Solution of State Equations, Concepts of controllability & observability, MATLAB based problems.~~

BOOKS RECOMMENDED

- [1] B.C. Kuo, *Automatic Control System, seventh edition* , 6/E(PHI), 2006.
- [2] Nagrath& Gopal, *Control System Engineering*, 5/E edition - (Newage Publishers), 2007.
- [3] M.Gopal, *Control Systems (Principles & Design)* - 5/E (TataMcGraw Hill), 2007.
- [4] Bishop & Dorf , *Modern Control System* - (Addison Welseley)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (E & TC)			
Subject Code-EIR6E1 Subject Name-Linear Integrated Circuit	Instructions Hours per Week			Credits			
Duration of Theory Paper: 3 Hours	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5

Learning Objectives:

In-depth knowledge of Operational Amplifier including its circuit analysis, design and application.

Prerequisites:

Analysis using R-parameter and feedback concept.

COURSE CONTENTS

UNIT I

Operational Amplifier Fundamentals: Amplifier Fundamentals, The Operational Amplifier, Basic Op Amp Configurations, Ideal and practical Op Amp Circuit Analysis and characteristics, Positive and Negative Feedback, Feedback in Op Amp Circuits, The Return Ratio and Blackman's Formula, Op Amp Powering. Circuits with Resistive Feedback: Current-to-Voltage Converters, Voltage-to-Current Converters, Current Amplifiers, Difference Amplifiers, Instrumentation Amplifiers, Instrumentation Applications, Transducer Bridge Amplifiers. CMRR, offset error voltage and current.

UNIT II

Active filters I: The Transfer Function, First-Order Active Filters, Standard Second-Order Responses, KRC Filters, Multiple-Feedback Filters, State-Variable and Biquad Filters, Sensitivity. Active filters II: Filter Approximations, Cascade Design, Generalized Impedance Converters, Direct Design, The Switched Capacitor, Switched-Capacitor Filters, and Universal SC Filters

UNIT III

Static Op Amp Limitation: Simplified Op Amp Circuit Diagrams, Input Bias and Offset Currents, Low-Input-Bias-Current Op Amps, Input Offset Voltage, Low-Input-Offset-Voltage Op Amps, Input Offset Error and Compensation Techniques, Input Voltage Range/Output Voltage Swing, Maximum Ratings. Dynamic Op Amp limitation: Open-Loop Frequency Response, Closed-Loop Frequency Response, Input and Output Impedances, Transient Response, Effect of Finite GBP on Integrator Circuits, Effect of Finite GBP on Filters, Current-Feedback Amplifiers.

UNIT IV

Stability: The Stability Problem, Phase and Gain Margin Measurements, Frequency Compensation of Op Amps, Op Amps Circuits with a Feedback Pole, Input-Lag and Feedback-Lead Compensation, Stability in CFA Circuits.

UNIT V

Designing- Adder, Subtractor, Integrator, Differentiator, Voltage follower, Comparator, Zero Crossing detector, Schmitt trigger, Peak Detector. Signal Generator: Sin wave generator, multivibrators, triangular and saw tooth wave generator, Log/Antilog amplifiers.

BOOKS RECOMMENDED:

- [1] Millman & Halkias - Integrated Electronics, Tata McGraw Hill.
- [2] Franco-Design with Operational Amplifiers & Analog Integrated Circuits, TMH
- [3] Schilling & Belove-Electronic Circuit, Discrete & Integrated , TMH
- [4] Gayakwad R.A- Op-Amps and Linear IC's, Pearson .
- [5] Coughlin and Driscoll – Operational Amplifier and Linear Integrated Circuits – Pearson Education
Asia.

List of Practical Assignments:

- 1) To measure the gain of inverting & non-inverting amplifier.
- 2) To analyze the voltage transfer characteristics of op-amp.
- 3) To study the inverting adder & Subtractor configuration of op-amp.
- 4) To study the non- inverting adder & Subtractor configuration of op-amp.
- 5) To study the differentiator configuration of op-amp.
- 6) To study the integrator configuration of op-amp.
- 7) To study the low pass & high pass filter.
- 8) To study the band pass & band reject filter.
- 9) To study the zero crossing detector.
- 10) To analyze the performance of comparator.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) V Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3EI305 Linear Devices and application	L	T	P		T H	C W	S W	P R	Total
		4	-	-	Ma x	10 0	50	-	-
Duration of paper: 3 hrs				Mi n	35	25	-	-	60

Course Objectives:

In-depth knowledge of Operational Amplifier including its circuit analysis, design and applications.

Prerequisite(s): Analysis using R- parameter model, Feed-back concept.

COURSE OF CONTENTS

Unit I

Operational amplifier

~~Introduction, internal architecture diagram, differential amplifier balanced, unbalanced, level shifter~~

~~Power amplifier, Feedback concept, ideal and practical op-amp characteristic, common mode-rejection~~

~~Ratio, offset error voltages and currents~~

Unit II

Basic op-amp circuits

Designing---Inverting ,noninverting amplifier, adder , subtractor ,voltage follower, integrator differentiator, comparator, zero crossing detector ,Schmitt trigger ,Voltage-to-current, current-to-voltage converter instrumentation amplifier ,logarithmic amplifier,

Unit III

Oscillators and signal generator

Designing -Frequency stability of oscillator , hartley ,colpitt ,crystal , phase shift ,wein's bridge oscillator ,Pulse and squarewaveform generator ,triangular waveform generator ,sweep frequency generator

Unit IV

Active filters

~~Low pass,high pass ,bandpass, band reject ,all pass filter , first order and higher order filters- Butterworth ,chybeshev filter ,~~

Unit V

IC voltage regulators

~~LM 305 ,319 ,723 ,gyrator,NIC convertor~~

BOOKS RECOMMENDED

- [1] Gayakwad, operational amplifier, 4/E Pearson Education, 2006.
- [2] Aatre *Network theory and Filter design*, PHI, 2000.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
SER6S6 Entrepreneurship Development & IPR	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide awareness about entrepreneurship.
2. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
3. To self motivate the students by making aware of different opportunities and successful growth stories
4. To impart the basics of Intellectual property Rights.

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise- Definition and Classification (MSME- Micro, Small & Medium Enterprises).

Case Study: Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model.

Class Activity: Idea generation by students.

UNIT III

Business Plan for New Ventures in Respective Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs, DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks.

Learning Outcomes:

At the end of the course, students should be able to do the following:

1. Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
2. Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1]. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2]. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications, New Delhi, 2011.
- [3]. N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) VI Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS357 Entrepreneurship Development & IPR	L	T	P		Th	Cw	Sw	Pr	Total
	2	-	-	Ma	-	50	-	-	50
Duration of Theory Paper: Only Internal Test				Min	-	25	-	-	25

Objectives: To impart the basics of Entrepreneurship development Concepts. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur. To impart the basics of Intellectual property Rights.

Pre-requisites: -NIL

COURSE OF CONTENTS

Unit I

Introduction:

Definition of Entrepreneurship and role of an entrepreneur. Entrepreneurial characteristics, values and attitudes. Entrepreneurship development programmes.

Unit II

Modes & Methodology of setting up a Small Scale Industry:

Project Identification, Market Survey, Location & Building, Technical Know-How, Raw material & other Utilities, Professional & Skilled Manpower, Project Report, Finance, Whom to Approach.

Unit III

Institutional Support to Entrepreneurs:

Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs, DTICs, industrial Estates, Specialized Institutions. Registration of a small scale Industry.

Unit IV

Intellectual Property Rights:

Introduction of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators, Sharing of Knowledge, Trade Marks etc. General Provisions & Basic principles of IPR.

Unit V

Patents:

Definitions, Need for a patents, what can be patented, Patent laws, Rights of Patent Holders, Filing of a Patent, Industrial Scenario.

BOOKS RECOMMENDED:

[1] Colombo plan staff college for Technician Education, Manila , *Entrepreneurship Development*,
Tata McGrawHill
1998

[2] N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New
Edition 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR6G4 COMPUTER NETWORKS	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives: The content covers the different types of computer networks, the layered approach of protocol stack, its advantage, and protocols of each layer.

Prerequisite(s): Fundamental knowledge of data transmission

COURSE OF CONTENTS

Unit I

Computer network – Hardware, Software, Reference model, physical layer

Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast ,broadcast ,Network Topology – Mesh , Star ,Tree , Bus , Ring , Hybrid Physical Layer – Shannon’s maximum data rate of a channel, **Transmission media – Guided as Magnetic, Twisted Pair, coaxial cable, fiber optics etc., wireless as radio wave, microwave, infrared**

Unit II

Data Link Layer

Framing techniques , Error detection-correction , Multiplexing-TDM ,FDM,WDM ; switching – circuit , message , packet switching , Repeaters, Hubs , Bridges ,switches ,routers and gateways ;Data link protocols-- unrestricted simplex protocol, stop & wait , sliding window ,Go-back- n ,selective repeat, data link layer in internet

Unit III

Medium Access control sublayer

Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol
Ethernet- frame format, cabling, encoding, performance, fast Ethernet, gigabit Ethernet, Broadband and wireless LAN, Bluetooth

Unit IV

Network layer

Connectionless – connection oriented service, comparison of virtual circuit and datagram subnet, Routing algorithms- shortest path , flooding ,distance vector , hierarchical routing , congestion control and prevention ,Quality of service , network layer in internet- IP protocol and IP address, IPv6, OSPF, BGP routing protocol

Unit V

Transport layer and Application layer

Elements of transport protocol, internet transport protocol-UDP / TCP protocol, performance issues-Network performance measurement, system design for better performance
Domain name system, email, world wide web- architecture, HTTP

Learning Outcome:

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.
7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

BOOKS RECOMMENDED

- [1] Andrew S. Tannenbaum, Computer Networks, 4/E Pearson Education, 2003 ,
- [2] William Stallings ,Data and Computer Communications , 8/E Prentice Hall India, 2007
- [3] Behrouz A.Forouzan , Data Communications and Networking ,4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) V Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
3EI301 Computer Networks	L	T	P		T H	C W	S W	P R	Total
	Duration of paper: 3 hrs	4	-	2	Ma x	10 0	50	50	50
				Mi n	35	25	25	25	110

Objectives: The contents covers the different types of computer networks, the layered approach of protocol stack, its advantage, and protocols of each layer.

Pre-requisites: Fundamental knowledge of data transmission.

COURSE OF CONTENTS

Unit I

Computer network – Hardware, Software ,Reference model , physical layer

Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast ,broadcast ,Network Topology – Mesh , Star ,Tree , Bus , Ring , Hybrid Physical Layer – Shannons maximum data rate of a channel ,

Unit II

Data Link Layer

Framing techniques , Error detection-correction , Multiplexing-TDM ,FDM,WDM ; switching – circuit , message , packet switching , Repeaters, Hubs , Bridges ,switches ,routers and gateways ;Data link protocols-- unrestricted simplex protocol, stop & wait , sliding window ,Go-back- n ,selective repeat, data link layer in internet

Unit III

Medium Access control sublayer

Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol
Ethernet- frame format, cabling , encoding ,performance, fast Ethernet, gigabit ethernet
Broadband and wireless LAN, bluetooth

Unit IV

Network layer

Connectionless – connection oriented service , comparison of virtual circuit and datagram subnet,
Routing algorithms- shortest path , flooding ,distance vector , hierarchical routing , congestion control and prevention ,Quality of service , network layer in internet- IP protocol and IP address, IPv6 ,OSPF,BGP routing protocol

Unit V

Transport layer and application layer

Elements of transport protocol , internet transport protocol-UDP / TCP protocol ,performance issues-

Network performance measurement , system design for better performance

Domain name system , email ,world wide web- architecture, HTTP

BOOKS RECOMMENDED

[1] Andrew S. Tannenbaum, *Computer Networks*, 4/E Pearson Education, 2003 ,

[2] William Stallings ,*Data and Computer Communications* , 8/E Prentice Hall India, 2007

[3] Behrouz A.Forouzan , *Data Communications and Networking* ,4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR6L4 DESIGN WORKSHOP	L	T	P	L	T	P	Total
Duration of Practical Paper: 2Hours	0	0	1	0	0	1	1

DESIGN (Digital & Analog circuit)

Q.1 Design a 3 bit counter which counts in the sequence : 001, 011, 010, 110, 111, 101, 001, ...

- (a) Use clocked D flip-flops
- (b) Use J-K flip-flop

Q.2 Design and Implement a 8-bit barrel shifter using 4 X 1 Multiplexers.

Q.3 Design a one-input, one-output serial 2's complementer. The circuit accepts a string of bits from the input and generates the 2's complement at the output. The circuit can be reset asynchronously to start and end the operation.

Q.4 Design a four-bit shift register with parallel load using D flip-flops. There are two control inputs: shift and load. When shift = 1, the content of the register is shifted by one position. New data are transferred into the register when load = 1 and shift= 0. If both control inputs are equal to 0, the content of the register does not change.

Q.5 Design a 16-bit Magnitude comparator using IC 7485 (4-bit Magnitude comparator).

Q.6 Design a hardware stack to hold a maximum of four values, each consisting of one bit. The stack has the following input lines:

- Clock
- POP
- PUSH
- input data

and a single output line. The output line always reports the current top of the stack.

(Recall that a stack pushes data onto the top of the stack, and pops data from the top of the stack. In other words, last in, first out. If more than four values are pushed on, older values are discarded.)

You may use AND, OR, XOR, and NOT gates, etc; flip-flops of any kind; and/or decoders, multiplexers, etc.

Analog Circuits

Q.1 Design a common-emitter amplifier with output impedance $10\text{K}\Omega$ and a gain of 100 using a transistor of $\beta=200$ and a 24V power supply.

Q.2 Design a two stage RC coupled BJT amplifier to meet the following specifications.
 $A_v \geq 5000$, $S_{ico} \leq 10$, $F_l = 20\text{Hz}$, $V_o = 2V_o$, $V_{cc} = 15\text{V}$.
Calculate A_v , R_i and R_o of designed circuit.

Q.3 Design a cascode amplifier stage using bipolar transistors to drive a load resistor of $100\ \Omega$. The amplifier output is to be time varying signal of $\pm 600\text{mV}$. The overall performance of the amplifier is specified as:

- Operating current for cascode stage collectors = $1,2\text{mA}$
- Overall gain = -30
- DC power supply +15V

Q. 4 Design the basic BJT differential amplifier to provide a differential input resistance of at and a differential voltage gain of $100\ \text{V/V}$. The transistor β is specified to be at least 100. The available positive power supply is 5V.

Q.5 Design a CMOS cascode amplifier with the following specifications:
DC gain = 2500
Gain-Bandwidth product = 100MHz .
Load capacitance = $1\ \text{pF}$

Q.6 Design a saw tooth generator using a 555 timer having pulse duration of 10 sec and peak voltage of 5V.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3EI356 Design Workshop	L	T	P		Th	Cw	Sw	Pr	Total
		-	-	2	Max	-	-	50	50
Duration of Theory Paper: Only Internal Test				Min	-	-	25	25	50

Course Objective: To introduce the Design and Realization of Electronics systems to solve engineering problems; good engineering Design practice; tools and materials relevant to electronics and electrical engineering. To provide initial training in Design skills required by Professional Engineers.

Prerequisites: Understandability of methods for A/D and D/A conversion, including concepts of resolution and accuracy necessary for conversion. Knowledge of Power requirements and efficiency, Power conversion and consumption and power demands of ICs, Supply decoupling. Estimation of power consumption in system from data sheets. Design of simple power supplies.

COURSE OF CONTENTS

Unit-I

Review

~~Review of DC Circuits, Active Circuits, Diodes, Bipolar Junction Transistors, Field Effect transistors, Capacitance & Inductance (including transformers), 1st & 2nd order Circuits (overview) Lap-lace Transforms (overview), s-Domain Circuit Analysis.~~

Unit-II

Power supplies and components

~~Sources of power. Ideal and practical supplies: regulation. Batteries: primary and secondary, types, capacity and life. AC power supplies: rectification, simple, half-wave and full-wave; need for filter (capacitor) to reduce ripple. Zener diode regulator. Linear regulator circuits; dropout. Power dissipation: heat sinks, thermal resistance, calculation of heat sink required. Switching supplies: principle of operation, configurations. Passive components: specification, construction. Printed circuit boards (PCBs); effect of non-ideal PCB tracks; good grounding practice. Pin-through-hole (PTH) and surface mount (SMD) devices.~~

Unit-III

Analog to digital and digital to analog conversion

~~Relation between analog and digital data: precision, resolution, range and accuracy. Types of classical analog to digital converters (ADC): successive approximation, pipeline. Reference sources. Signal conditioning, sample-and-hold circuit. Sampling rate, Nyquist criterion, aliasing and need for anti-aliasing filter, over-sampling. Sigma-delta converters, principle of operation, effect of over-sampling ratio.~~

Unit-IV

Electronic Computer Aided Design

~~Computer aided design for electronic circuits, graphical schematic capture, drawing standards for electronic systems, simulation using EDA software available, generation of part lists, printed circuit board layout and production.~~

Unit-V

Electronics Design Project

~~System Design project: assembly, test and rework of printed circuit board; Design of Engineering system including analogue, digital and hybrid electronics and real time software; use of test instruments including generated test patterns; software; integration of hardware and software.~~

BOOKS RECOMMENDED

- [1].P Horowitz and W Hill, *The Art of Electronics*, 2/e Cambridge, 1989
- [2].A S Sedra and K C Smith, *Microelectronic Circuits*,5/e Oxford ,2004
- [3].B Baker A Baker's Dozen, *Real Analog Solutions for Digital Designers*, Newnes ,2005
- [4].W Jung, *Op Amp Applications Handbook*, Newnes, 2005
- [5].W Kester, *Mixed-signal and DSP Design Techniques*, Newnes, 2003
- [6].W Kester, *Data Conversion Handbook*, Newnes, 2004
- [7].R Mancini, *Op Amps for Everyone*, Newnes, 2003
- [8].S J Sangwine *Electronic Components and Technology*, StanleyThornes, 1998

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics &Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C1 PROJECT PHASE-I	L	T	P	L	T	P	Total
	0	0	14	0	0	7	7

Learning Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

Prerequisites: Electronics and Computer related subjects till III year.

COURSE CONTENTS

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics ,VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Work in a team
- Develop small working projects through designing, analysis and testing of model
- Able to give presentation on the project developed

BOOKS RECOMMENDED:

[1] Reference books and web links of the relevant material the must be consulted as advised by the guide.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Instrumentation) VI Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		T H	C W	S W	P R	Total
3EI351 PROJECT PHASE - I	-	-	2	Ma x	-	-	10 0	50	150
				Min	-	-	50	25	75

Course Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics, Sensor & Transducers, VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

[1] Reference books and web links of the relevant material the must be consulted as advised by the guide.

Note: The requirement of relevant book may be submitted by the guide to the HOD/ Director for procurement.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C2 OPERATING SYSTEM	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objectives:

The course contents are aimed to provide:

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management

Prerequisites: Basic knowledge of Data Structures and Computer Organization.

COURSE CONTENTS

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

UNIT-IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

Upon Completing the Course, Student will able to learn:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

- [1]. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
- [2]. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
- [3]. Tanenbaum, Modern Operating Systems, PHI.
- [4]. W. Stalling, Operating Systems, Macmillan.
- [5]. H. M. Dietel, Operating Systems, Addison Wesley Longman.
- [6]. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
- [7]. Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
	L	T	P						
4EI305 Industrial Automation				Max	100	50			150
Duration of Theory Paper: hrs	4	-	-	Min	35	25			60

Course Objective: The primary concern of this course is to provide the student with basic skills useful in identifying the concepts of automated machines and equipment and describe the terms and phrases associated with industrial automation. Students will be competence in maintaining and troubleshooting technology includes identifying, understanding, and performing preventative maintenance and service on technology;

Prerequisite: Computer Networks, Sensor and Transducers

COURSE OF CONTENTS

Unit I

Plant wide Control Systems & Strategy, Evolution of instrumentation & control, Role & Benefit of automation in industries, Automation strategy evolution, Control system audit, performance criteria, Safety Systems, Introduction to ISO systems for industrial automation. Industrial symbols, Industrial Block Flow Drawings, Process Flow Drawings (PFD), Piping and Instrument Drawings (P&ID), Electrical Schematics, Isometrics

Unit II

Instrumentation Standard Protocols: HART Protocol, Field bus H1, GPIB, CAN, Industrial Ethernet etc. introduction, frame structure, programming, implementation examples, Benefits, Advantages and Limitations,

Unit III

Applications of PLC and SCADA: applications for batch process using SFC, PLC interface to SCADA/DCS using communication links (RS232, RS485) and protocols (Modbus ASCII/RTU)

Unit IV

DCS introduction, functions, advantages and limitations, DCS Architecture of different makes, DCS detail engineering, specifications, configuration and programming, functions including database management, reporting, alarm management, communication, third party interface, control, display etc. Enhanced functions viz. Advance Process Control, Batch application, Historical Data Management, OPC supports, Security and Access Control etc.

Unit V

Robots classification, specifications, notation, Direct Kinematics, Co-ordinate frames, rotations, Homogeneous coordinates, the Arm equation, Inverse Kinematics problem, Tool configuration, Workspace analysis, trajectory planning, work envelopes of robots, the pick and place operation,

Continuous path motion, interpolated motion, Straight line motion, Tool configuration, Jacobian matrix, Jacobian-Manipulator Dynamics, Dynamic model using Lagrange's Equation. Robot control problem, State equations like Single axis PID, PD, gravity control, Computed torque control, Variable Structure control, Impedance control.

References:

[1]. Steve Mackey, Edwin Wright, *Practical Industrial Data Networks*, 1/e, Elsevier Publications, 2004
 [2]. Richard L. Shell, Ernest L. Hall, *Handbook of Industrial Automation*, 1/e, Marcel Dekker, Publication, 2000
 [3]. David Bailey, Edwin Wright, *Practical SCADA for Industry*, 1/e, Elsevier Publication, 2003
 [4]. Poppovik Bhatkar, *Distributed Computer Control for Industrial Automation*, Dekkar Publications.
 [5]. Webb and Reis, *Programmable Logic Controllers: Principles and Applications*, PHI
 [6]. S.K. Singh, *Computer Aided Process Control*, PHI
 [7]. N.E. Battikha, *The Management of Control System: Justification and Technical Auditing*, ISA
 [8]. Garry Dunning, *Introduction to Programmable Logic Controllers*, Thomson Learning.
 [9]. Robert J Schilling, *Fundamentals of Robotics-Analysis and Control*, Pearson Education, Asia
 [10]. C Roy Asfahl, *Robots and Manufacturing Automation*, John Wiley & Sons

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
EIR7C3 Intelligent Instrumentation System	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To get students familiar with interfacing of computer systems with the control theory thus making it an automatic system and to learn the Lab View programming and its application in different process industries.

Prerequisites (if any):

Control System, Transducers & Applications, Computer networking, Communication Systems

COURSE CONTENTS

UNIT-I

Introduction: Introduction to intelligent instrumentation, Historical perspectives, Current status, Software based instruments. Virtual Instrumentation: Introduction to graphical programming, data flow and graphical programming techniques.

UNIT-II

Instrumentation Standard Protocol: HART protocol, Field Bus H1, GPIB, CAN, Industrial Ethernet: introduction, frame structure, programming, implementation, benefits, advantages and limitation.

UNIT-III

Introduction To SCADA: SCADA system, evolution, objectives, benefits and function of SCADA system. SCADA in process control, application, SCADA function, SCADA hardware: RTU, Single board RTU, Basic Operation, Features of SCADA, SCADA software: ISO model, DNP3 protocol, IEC60870 protocol, MODBUS protocol. Power System Automation: benefits, architecture classification, implementation, SCADA applications.

UNIT-IV

Distributed Control System: Introduction and overview, history, system architecture, system element. Difference between Centralized and Distributed Control System, Overall tasks of DCS. Displays: Group display, Overview display, Detail display. Local Control Units, mean time between failures, Data Highways, Fieldbuses, Multiplexers and remote sensing terminal units, I/O hardware, Set-point stations

UNIT-V

PC Hardware review and Instrumentation buses: structure, timing, interrupts, DMA, operation systems, ISA, PCI, USB, PCMCIA buses. IEEE488.1 and IEEE488.2 serials, SCXI and PXI.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Understand the concept of intelligent instrumentation
2. Identify the optimized protocol selection according to the application area
3. Design complete automatic process control system
4. Analyze the DCS and SCADA systems In industry

BOOKS RECOMMENDED:

1. Liptak B.G, *Instrument Engineers Handbook*, Clinton Book Company, (1982)
2. D.Patranabis, *Principles of Industrial Instrumentation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999.
3. SteveMackey, Edwin Wright, *Practical Industrial Data Network I/e*, Elsevier Publications, 2004
4. David Bailey, Edwin Wright, *Practical SCADA for Industry, I/e*, Elsevier Publications, 2003
5. Poppovik Bhatkar, *Distributed Computer Control for Industrial Automation*, Dekkar Publications.

List of Practical Assignments:

To perform the following operations using Lab View.

1. Basic arithmetic operations
2. Boolean operations
3. Sum of 'n' numbers using 'for' loop
4. Factorial of a give number using for loop
5. Sum of 'n' natural numbers using while loop
6. Factorial of a give number using while loop
7. Sorting even numbers using while loop in an array
8. Array maximum and minimum
9. Bundle and unbundle cluster
10. Flat and stacked sequence
11. Application using formula node
12. Median filter
13. Discrete cosine transform
14. Convolution of two signals
15. Windowing technique
16. Instrumentation of an amplifier to acquire an ECG signal
17. Acquire, analyse and present an eeg using virtual Instrumentation.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
	L	T	P						
4EI302 Sample Data & Non-Linear Control				Max	100	50	50	50	250
Duration of Theory Paper: 3 hrs	4	-	2	Min	35	25	25	25	110

Course Objective: The objective is to give students a clear understanding on characteristics of digital control systems from both frequency and time domain viewpoints.

Prerequisite: Knowledge of classical control methods & MATLAB control system toolbox

COURSE OF CONTENTS

Unit-I

~~Data conversion & quantization, Sampling process, mathematical analysis of sampling process, Reconstruction of sampled signal, zero order, first order hold Z-transform definition, evaluation of Z transform, inverse Z transform, pulse transfer function, limitations of Z transform, relationship between s plane & z plane.~~

Unit-II

~~Block diagram reduction for systems interconnected through samplers, Sampled Signal flow graphs Stability definition, Jury's test of stability, extension of Routh Hurwitz criterion to discrete time systems, steady state error analysis.~~

Unit-III

~~Root Loci, Frequency domain analysis, Bode plots, Nyquist plots, Gain margin & phase margin Digital implementation of analog controllers: Forward difference, backward difference, bilinear Tustin, Tustin with pre-wrapping. Digital controller Design: Classical methods, digital PID's, digital lead lags, dead beat controller~~

Unit-IV

~~State space representation of discrete time systems, Solution of state equation, Pulse transfer function from state equation, Response between sampling instant using state model, observability, controllability, useful transformation in state space, pole placement methods, controller implementations, State observers.~~

Unit-V

~~Introduction, General properties of linear and nonlinear systems, describing function analysis: Definition, limitations, use of describing function for stability analysis, describing function of ideal relay, relay with hysteresis, dead zone, saturation, coulomb friction and backlash, Phase Plane Analysis, phase portrait of second order nonlinear systems, limit cycle, Equilibrium finding, Stability of Nonlinear Systems: Liapunov Theorems,~~

References:

- [1] Kuo, *Digital Control System*, 2/e Oxford Press, 1992.
- [2] Ogata, *Discrete – Time Control System*, 2/e PHI, 1995.
- [3] G.F. Franklin , J.D. Powell, *Digital Control of Dynamic Systems*, Addison-Wesley, 1980.
- [4] M Gopal, *Digital Control System*, TMH, 1997.
- [5] H. K. Khalil, *Nonlinear Systems*, 3/e, Prentice Hall, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C4	L	T	P	L	T	P	Total
Process Instrumentation & control	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The course aims to provide students with the knowledge about behaviour of industrial processes, builds the concepts related to operation and control of dynamic processes, and learns various strategies of processes control. Learn theoretical and practical aspects for the design and operation of process control systems.

Prerequisites (if any):

Control System, Sensor & Transducers

Course of Contents

UNIT-I: Introduction to process control

Objectives of Control, Process Characteristics: Process Equation, degrees of freedom, process and control lag, dead time, load disturbance and its effect on processes, analog control, digital control, Self regulating processes, final control elements, valves and actuators, their various characteristics, **piping and instrumentation diagram.**

UNIT-II: Control modes

Basic Control action, two position, multi-position, floating Control modes, Continuous controller modes: Proportional, integral, derivative, composite controller modes-I, P-D, P-I-D, comparisons of these control actions, design of various kinds of analog controllers, Parameters Adjustment, Controller tuning methods,

UNIT-III: Controllers- other modes

Modelling of simple systems-gas liquid and thermal systems, Concept of resistance and capacitance, Nozzle-flapper system, Pneumatic relays and amplifiers, Hydraulic systems, realization of various kinds of controllers for hydraulic and pneumatic applications.

UNIT-IV: Discrete state process control

Discrete state Control, Discrete state variables, Event sequence description, ladder diagram, relay sequencer, **Programmable logic controller- Architecture, operation and programming**

UNIT-V: Case studies

Cascade control, ratio control, feed-forward control, selective Control, Split range Control
Boiler Control: Combustion Control, Oxygen/CO trimming, Feedwater Control, Furnace Control, Steam temp. Control, Distillation column control

Recommended books:

1. D.P. Eckman “Automatic Process control” Wiley Publication.
2. Patranabies “Principles of Process control” Tata Mc Graw Hill Pub, (2006)
3. P. Harriott “Process control” McGraw-Hill: New York, 1964
4. Curtis Johnson “Process control Instrumentation Technology” Prentice Hall, New Delhi (2005)
5. B.G. Liptak “Hand Book of Process control” Taylor & Francis Ltd
6. Shinskey, “Process Control systems: Application, Design & Tuning” 4th Edition, McGraw Hill, Singapore (1996)

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Understand the basic principles, terminologies, mathematical analysis and block diagrams related to the industrial processes.
2. Comprehend the use of various components, instrumentation and strategies for controlling and fine tuning the process.
3. Develop skills for the efficient design of process control loops for process engineering plants.

List of Experiments

1. Study, design and fine tuning of a pressure based control loop.
2. Study, design and fine tuning of the flow based control loop.
3. Study the ratio control system for the mixing of two fluid.
4. Study cascade control based strategy for the control of liquid flow in a closed channel.
5. Design and development of advanced PC based multi process control system.
6. Study and implementation of various control strategies using temperature control system
7. Study of a PID controller.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
	L	T	P						
4EI304 Process Instrumentation				Max	100	50	50	50	250
Duration of Theory Paper: hrs	4	-	2	Min	35	25	25	25	110

Course Objective: To enable students to understand the basic concept of process instrumentation applicable in various industries. It will also give in depth knowledge regarding different type of control strategies instrumentation and controller used in processing industries.

Prerequisite: Basics of control system, Digital design.

COURSE OF CONTENTS

Unit I

Objectives of Control, Process Characteristics: Process Equation, degrees of freedom, process and control lag, dead time, load disturbance and its effect on processes, analog control, digital control, Self regulating processes, final control elements, valves and actuators, their various characteristics.

Unit II

Basic Control action, two position, multi-position, floating Control modes, Continuous controller modes: Proportional, integral, derivative, composite controller modes-I, P-D, P-I-D, comparisons of these control actions, design of various kinds of analog controllers, Parameters Adjustment, Controller tuning methods,

Unit III

Modeling of simple systems-gas liquid and thermal systems, Concept of resistance and capacitance, Nozzle-flapper system, Pneumatic relays and amplifiers, Hydraulic systems, realization of various kinds of controllers for hydraulic and pneumatic applications.

Unit IV

Discrete state Control, Discrete state variables, Event sequence description, ladder diagram, relay sequencer,

Unit V

Cascade control, ratio control, feed-forward control, selective Control, Split range Control
Boiler Control: Combustion Control, Oxygen/CO trimming, Feedwater Control, Furnace Control, Steam temp. Control, Distillation column control

References:

- [1] D.P. Eckman ,*Automatic Process control*, Wiley Publication.
- [2] Patranabies ,*Principles of Process control*, Tata Mc Graw Hill Pub, (2006)

- [3] P. Harriott ,*Process control*, McGraw-Hill: New York, 1964
- [4] Curtis Johnson ,*Process control Instrumentation Technology*, Prentice Hall, New Delhi (2005)
- [5] B.G. Liptak ,*Hand Book of Process control*, Taylor & Francis Ltd
- [6] Shinskey, *Process Control systems: Application, Design & Tuning*, 4/e McGraw Hill, Singapore (1996)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7E1 CIRCUIT DESIGN USING HDL	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL. Perform synthesis, place, and route of a digital design into a target FPGA.

Prerequisite: Digital Design, C language.

COURSE CONTENTS

Unit I Introduction to VLSI and HDL

History of IC Design, IC Technology, Moore's Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic- Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski's Y Chart.

Digital system design process, Hardware simulation, Levels of abstraction, VHDL requirements, Elements of VHDL Top down design, **VHDL basic language Elements**, VHDL operators, Timing, Concurrency, Objects and classes.

Unit II Behavioural Modelling

Signal assignments ,Concurrent and sequential assignments., Entity Declaration, Architecture Body, Behavioural Modelling, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers.

Unit III Dataflow and Structural Modelling Techniques: Data flow Modelling, Concurrent Assignment statements, Block statements, Structural Modelling, Component declaration and Instantiation, Generate statements

Unit IV Advance Topics in VHDL

Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Attributes.

Unit V Design for Synthesis

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints, Synthesis for dataflow and structural models.

Learning Outcomes:

At the end of the course, the students would be:

- Able to design digital systems through HDL language
- Simulation, synthesis and implementation of HDL code
- Implementation of code on FPGA/CPLD

BOOKS RECOMMENDED:

[1].J. Bhasker, *VHDL Primer*, 3/e, Addison Wesley, 1999.

[2].Sudhakar Yalamanchili, *Introductory VHDL-From Simulation to Synthesis*, Pearson Education, 3/e Indian Reprint.

[3].Douglas Perry, *VHDL*, 3/e Edition, McGraw Hill 2001.

[4].Peter.J.Ashenden, *The Designer's Guide to VHDL-AMS*,

[5].Charles.H.Roth, *Digital system Design using VHDL*, Thompson Publishers, 2/e Edition, 2007.

[6].Ben Cohen, *VHDL-Coding style and Methodologies*, Kluwer academic Publishers, 1995.

[7].Volnei. A.Pedroni, *Circuit Design with VHDL*, MIT Press Cambridge, 2004.

List of Practical Assignments:

VHDL Programming using Xilinx ISE

Note: For Q1 to Q5 use behavioral modeling. For Q6 to Q7 use data flow modeling and for Q8 to Q10 use structural modeling.

Q.1 Write a VHDL code for a Full Adder.

Q.2 Write a VHDL code for 8X1 Multiplexer using if-elseif statement, case statement and nested if statement and compare their delay and area.

Q.3 Write a VHDL code for a 3X8 decoder using case statement.

Q.4 Write a VHDL code for a J-K flip-flop triggered at falling edge of clock pulse. Also include clear and reset pins synchronized with clock pulse.

Q.5 Write VHDL code for a synchronous 3-bit binary up-down counter. Include a selection line for selecting the mode of counting upwards or downwards.

Q.6 Design a combinational circuit with three inputs x, y, and z and three outputs A,B and C. when the binary input is 0,1,2, or 3 the binary output is one greater than the input otherwise the binary output is one less than the input.

Q.7 Write a VHDL code for a 3-bit binary code to 3-bit gray code conversion.

Q.8 Design a 4-bit ripple counter using T-Flip flop as basic component.

Q.9 Design a 4-bit Magnitude comparator using 1-bit Magnitude comparator as basic entity.

Q.10 Design a circuit of a 3-bit parity generator and the circuit of a 4-bit parity checker using an odd parity bit.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per Week			Marks					
4EI351	L	T	P		T H	C W	S W	P R	Total
Circuit Design Using HDL	4	-	-	Ma x	10 0	50	-	-	150
Duration of paper: 3 hrs				Min	35	25	-	-	60

Course Objective: To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL. Perform synthesis, place, and route of a digital design into a target FPGA. Introduction of Analog and mixed signal design using VHDL-AMS

Prerequisite: Digital Design, C language.

COURSE OF CONTENTS

Unit I Introduction to VLSI and HDL

History of IC Design, IC Technology, Moore's Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic- Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski's Y Chart.

Digital system design process, Hardware simulation, Levels of abstraction, VHDL requirements, Elements of VHDL Top down design, VHDL operators, Timing, Concurrency, Objects and classes.

Unit II Behavioral Modeling

Signal assignments ,Concurrent and sequential assignments., Entity Declaration, Architecture Body, Behavioral Modeling, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers.

Unit III Dataflow and Structural Modeling Techniques

Data flow Modeling, Concurrent Assignment statements, Block statements, Resolution Functions, Structural Modeling, Component declaration and Instantiation, Generate statements.

Unit IV Advance Topics in VHDL

Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Attributes, ~~Hardware Modeling Examples: Modeling of digital circuits used in communication, signal conditioning and instrumentation blocks.~~

Unit V Design for Synthesis and Introduction to VHDL-AMS

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints, Synthesis for dataflow and structural models.

~~Introduction to VHDL AMS, Free quantities, Terminal and Branch quantities, Attributes, Simultaneous statements, Analog structure description, Discontinuities and break statements, step specifications, Mixed signal description, Design Processing.~~

References:

- [8]. J. Bhasker, *VHDL Primer*, 3/e, Addison Wesley, 1999.
- [9]. Sudhakar Yalamanchili, *Introductory VHDL-From Simulation to Synthesis*, Pearson Education, 3/e Indian Reprint.
- [10]. Douglas Perry, *VHDL*, 3/e Edition, McGraw Hill 2001.
- [11]. Peter.J.Ashenden, *The Designer's Guide to VHDL-AMS*,
- [12]. Charles.H.Roth, *Digital system Design using VHDL*, Thompson Publishers, 2/e Edition, 2007.
- [13]. Ben Cohen, *VHDL-Coding style and Methodologies*, Kluwer academic Publishers, 1995.
- [14]. Volnei. A.Pedroni, *Circuit Design with VHDL*, MIT Press Cambridge, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C1 PROJECT PHASE-II	L	T	P	L	T	P	Total
	0	0	14	0	0	7	7

Learning Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

Prerequisites: Electronics and Computer related subjects till III year.

COURSE CONTENTS

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics/Communication ,VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Work in a team
- Develop small working projects through designing, analysis and testing of model
- Able to give presentation on the project developed

BOOKS RECOMMENDED:

[1] Reference books and web links of the relevant material the must be consulted as advised by the guide.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
	L	T	P						
4EI301 Project Phase-II				Max	-	-	100	50	150
Duration of Theory Paper: P	-	-	2	Min			50	25	75

Course Objective: To provide a comprehensive hands on experience to the students about the development of a complete project starting from analysis to testing. The students can also take a research project for innovating a new idea and its implementation.

The major emphasis (but not limited to) shall be given on Microcontroller, Microprocessors, Analog and Digital Electronics, Sensor & Transducers, VLSI and VHDL etc these are practice oriented areas of interest. The students shall be making the system, application or simulation packages depending upon the idea, technology chosen and expertise available. The architectural issues shall be important while the exposure to the technology needs to be gained by the students through thorough practice.

The students (in a batch) shall be required to be continuous interaction with the guide for the advice, guidance and facilities periodically and show the progress. They shall also be taking a certificate in the diary for satisfactory remarks or comments. Batch size shall be decided as per need and the quantum of the project.

The students shall make presentation and submit an originally drafted project reports periodically and at the end of the semester.

[1] Reference books and web links of the relevant material the must be consulted as advised by the guide.

Note: The requirement of relevant book may be submitted by the guide to the HOD/ Director for procurement.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C2	L	T	P	L	T	P	Total
EMBEDDED SYSTEM	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objective:

- The goal of the course is to teach the concepts C Language and object oriented programming, PIC architecture and peripheral interfacing.
- To read and understand the C and C++ programming, PIC microcontroller architecture and programming and RTOS.
- The course focuses on how to write program and peripheral interfacing of PIC microcontroller and develop the applications.

Prerequisite: Knowledge of C language, Computer architecture and Microcontroller.

COURSE CONTENTS

UNIT I -Introduction to Embedded systems: Embedded systems, processor embedded into a system, embedded hardware units and devices in a system, embedded software in a system, examples of embedded systems, embedded SOC and use of VLSI circuit design technology, Complex systems design and processors, Design process in embedded system, formalization of system design, design process and design examples, classification of embedded systems, skills required for an embedded system designer.

UNIT II- Microcontrollers: PIC 16 Series family overview, an architecture overview of the 16F84A, Status register, 16F84A memory, Some issues of timing, Power-up and Reset, PIC 16F84A parallel ports, 16F84A clock oscillator, 16F84A operating conditions, 16F84A interrupt structure.

UNIT III-Larger systems and the PIC 16F873A:The main idea –the PIC 16F87XA, The 16F873A block diagram and CPU, 16F873A memory and memory maps, 16F873A interrupts, 16F873A oscillator, reset and power supply, 16F873A parallel ports.

UNIT IV-RTOS: Basic design using RTOS, Micro/OS-II and Vxworks, windows CE, OSEK, real-time Linux functions,

UNIT V- Case study: Digital camera hardware and software architecture, embedded systems in automobile, embedded system for a smart card, mobile phone software for key inputs.

Learning Outcome:

After learning the course the students should be able to

- Understand the fundamentals of embedded systems
- Understanding of C and basics of C Understand the OOP concepts of classes, objects, methods,
- constructors, destructors in C++
- Understand the microcontroller architecture (PIC)
- Understand and able to write the assemble language program.
- Understand and able to write the I/O and timers/counter programming

BOOKS RECOMMENDED:

- [1].Embedded Systems Architecture Programming and Design by Raj Kamal, II edition, Tata McGraw-Hill.
- [2].Designing Embedded Systems with PIC Microcontroller s: principles and applications by Tim Wilmshurst, Elsevier.
- [3].Embedded Systems Design by Steve Heath, II edition, Newnes publications
- [4].Embedded Systems Architecture: A Comprehensive Guide for Engineers and
- [5].Programmers by Tammy Noergaard, Elsevier

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per Week			Marks					
4EI354 Analytical Instrumentation	L	T	P		T H	C W	S W	P R	Total
	4	-	2	Ma x	10 0	50	50	50	250
	Duration of paper: 3 hrs			Mi n	35	25	25	25	110

Course Objective: This course exposes the students to various instruments and techniques used in the analysis and Identification of elements and compounds

Prerequisite: Knowledge of basic Electronics and Fundamentals of Chemistry

COURSE OF CONTENTS

Unit I

~~Colorimeters, Visible Ultraviolet Spectrometers, Infrared Spectrometers, Atomic Absorption Spectrometers~~

Unit II

~~Fluorimeters, Phosphorimeters, Raman Spectrometer, Photo Acoustic, Photothermal Spectrometers Mass Spectrometers~~

Unit III

~~Nuclear Magnetic Resonance Spectrometers, Electron Spin Resonance Spectrometers, Electron and Ion Spectroscopy, X-ray Spectrometers~~

Unit IV

~~Gas Chromatographs, Liquid Chromatograph, Thermo Analytical Methods~~

Unit V

~~PH Meters, Blood Gas Analyzer, Industrial Gas Analysers, Environmental Pollution Monitoring Instruments~~

References:

- [1]. H. H. Williard, L. L. Merrit, J. A. Dean, and F. A. Settle, *Instrumental Methods of Analysis*, 7/e, CBS Publishers and Distributors, India, 1988
- [2]. D. A. Skoog, F. J. Holler, and T. A. Nieman, *Principles of Instrumental Analysis*, 6/e., Thomson Learning, 1998
- [3]. R. S. Khandpur, *Handbook of Analytical Instruments*, Tata McGraw Hill, New Delhi
- [4]. R. K. Jain, *Mechanical and Industrial Measurements*, Khanna Publishers, Delhi, 1985
- [5]. G. W. Ewing, *Instrumental Methods of Chemical Analysis*, 5/e., McGraw Hill, Singapore, 1992

[6].R. E. Sherman and L. J. Rhodes (Eds), *Analytical Instrumentation*, ISA Press, New York, 1996

[7].B. G. Liptak, *Process Measurement and Analysis*, 3rd ed., Chilton Book Company, Pennsylvania, 1995

[8].Behrouz A.Forouzan , *Data Communications and Networking* ,4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C3	L	T	P	L	T	P	Total
OPTICAL INSTRUMENTATION	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To understand fundamentals of optical communication system, its various elements, and optical networking

Prerequisites: Basic knowledge of electromagnetic theory

COURSE CONTENTS

UNIT-I

Introduction to optical fiber communication system, Advantages of optical fiber communication over conventional electrical communication, review of optical fiber fundamentals, ray theory transmission, electromagnetic mode theory for optical propagation in optical waveguides, Types of optical fibers: step index fibers, graded index fibers, single mode fibers etc., cut off wavelength

UNIT-II

Transmission characteristics: fiber attenuation, absorption and scattering losses, fiber bend loss, fiber dispersion, intermodal and intra-modal dispersion, overall fiber dispersion, dispersion shifted fibers, dispersion flattened fibers, non-zero-dispersion shifted fibers, polarization maintaining fibers.

UNIT-III

Optical sources: Lasers and LEDs: basic concepts, injection laser, characteristics, temperature dependence, dynamic response, noise, reliability, Optical detection principle, absorption, quantum efficiency, responsivity, large wavelength cut off, pin photodiode, avalanche photodiode, receiver: basic concepts and types of noise.

UNIT-IV

Optical networks: Basic principles and components, couplers, isolators, circulators, multiplexers: gratings, Fabry perot filters, multilayer dielectrics, Mach-Zehnder interferometer, Acousto-optic tunable filters, Optical amplifiers-Semiconductor optical amplifiers, Erbium doped fiber amplifiers, wavelength converters, optical switches, optical add-drop multiplexers

UNIT-V

Optical networks: architecture, Synchronous optical network/ synchronous digital hierarchy-elements, multiplexing, layers, frame structure, WDM network architectures, broadcast and select networks, wavelength routed networks, routing and wavelength assignment (RWA), access networks, Optical OFDM, Flexible optical networks

Learning Outcomes:

Upon completing the course, students will be well versed with the fundamental concepts of optical instrumentation, and will be able to contribute to the current and upcoming advances in the technology.

BOOKS RECOMMENDED:

- [1] John M Senior, Optical fiber Communication: Principles and Practice, Pearson Education - 2006
- [2] Gerd Keiser, Optical fiber communication, Fifth Edition McGraw Hill Education (India), 2013
- [3] Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks : A Practical Perspective", Harcourt Asia Pte Ltd., Second Edition 2004.
- [4] C. Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks : Concept, Design and Algorithms", Prentice Hall of India, 1st Edition, 2002

List of Practical Assignments:

- 1) To set-up a fiber optic analog link
- 2) To set up a fiber optical digital link
- 3) To obtain intensity modulation of an analog signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- 4) To obtain intensity modulation of a digital signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- 5) To study the frequency modulation in case of fiber optic communication system.
- 6) To undertake the pulse width modulation in case of fiber optic communication system.
- 7) To determine the propagation losses in case of optical fiber communication system.
- 8) To evaluate bending losses in case of optical fiber communication system.
- 9) To determine the numerical aperture of an optical fiber
- 10) To study the characteristics of frequency modulation in case of fiber optic communication system.
- 11) To plot the electrical to optical conversion characteristics

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	Instructions Hours per Week			Marks					
4EI355 Optical Communication	L	T	P		T H	C W	S W	P R	Total
	4	-	-	Ma x	10 0	50	-	-	150
Duration of paper: 3 hrs				Mi n	35	25	-	-	60

Course Objective: To provide the fundamentals of optical communication systems and its various elements

Prerequisite: Knowledge of Electromagnetic fields & waves and basic concepts of Lasers and optical fiber

COURSE OF CONTENTS

Unit I

Introduction to optical fiber communication systems, Advantages of optical fiber communication over conventional electrical communication, review of optical fiber fundamentals, ray theory transmission, electromagnetic mode theory for optical propagation, cylindrical fiber; modes, mode coupling, step index fibers, graded index fibers, single mode fiber; cutoff wavelength, mode field diameter & spot size, effective refractive index.

Unit II

Transmission characteristics of optical fibers; attenuation, material absorption losses in silica glass fibers, linear scattering losses, nonlinear scattering losses, fiber bend loss, dispersion; intermodal dispersion, intra modal dispersion, modal noise, overall fiber dispersion, dispersion shifted fiber.

Unit III

Optical sources: Lasers & LEDs; review of basic concepts, semiconductor injection laser (injection laser diode), efficiency, injection laser characteristics; threshold current temperature dependence, dynamic response, frequency chirp, noise, reliability, comparison of LED & Lasers. Optical detectors: optical detection principle, absorption, quantum efficiency, responsivity, long wavelength cutoff, pin photodiode, avalanche photodiode, benefits and drawbacks with the avalanche photo diode.

Unit IV

~~Introduction to receiver, types of noise, receiver noise, p n & p i n photodiode receiver, APD receiver. Optical Amplifiers; Semiconductor Optical Amplifiers (SOAs), Erbium doped fiber amplifiers, crosstalk in SOAs. Nonlinear effects; self phase modulation, cross phase modulation, four wave mixing, solitons.~~

Unit V

~~WDM concepts & components overview of WDM, passive optical couplers; 2X2 fiber coupler, star couplers, Mach-Zehnder interferometer multiplexers, fiber grating filters, dielectric thin film filters.~~

References:

- [1]. John M. Senior, *Optical Fiber Communications: Principles and Practice*, LPE, Pearson Education-2006.
- [2]. Gerd Keiser, *Optical Fiber Communications*, Tata McGraw Hill Education Private Limited, New Delhi, 2008.
- [3]. Joseph C. Palais, *Fiber Optic Communication*, PHI.
- [4]. Gowar, *Optical Communication Systems*, PHI.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8C4	L	T	P	L	T	P	Total
INTERNET OF THINGS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Prerequisite: Computer Network, C Language

COURSE CONTENTS

Unit I

IoT Introduction, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit II

Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Unit III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IoT Security, Common Challenges in IoT Security, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment

Unit V

IoT Physical Devices and Endpoints - Building iot with Arduino: Arduino – Interfaces - Arduino IDE – Programming , RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Learning Outcomes:

At the end of the course, the students would be:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

BOOKS RECOMMENDED:

- [15]. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 st Edition, Pearson Education
- [16]. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.
- [17]. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1 st Edition, VPT, 2014.
- [18]. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017.

List of Practical Assignments:

1. To study the architecture of application board of Raspberry Pi.
2. To demonstration the OS (Debian) for RPi in a SD card preparation, configuration of Raspberry Pi during first booting and use of remote SSH like putty
3. To demonstrate the basic linux commands on Raspberry pi.
4. To create a database & Store the value in Raspberry Pi.
5. To install Android on Raspberry Pi.
6. To Setup R Pi first time without using screen, mouse, keyboard.
7. To interface ADC at GPIOs of Raspberry Pi for measuring analog voltage.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR8E1	L	T	P	L	T	P	Total
NETWORK SECURITY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the fundamentals of Cryptography.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

Prerequisite: Computer Network

COURSE CONTENTS

Unit I

An overview of network system & OSI model, concept of security- approaches and principles , attacks, cryptography technique, encryption & decryption, substitution & transport technique, symmetric & asymmetric cryptography,

Unit II

An overview of symmetric key cryptography algorithm types and modes, data encryption standard (DES), Advanced encryption standard(AES)-criteria, transformation , International data encryption algorithm (IDEA).

Unit III

Asymmetric key cryptography, RSA cryptosystem-, Digital signature -process ,service & scheme, Knapsack algorithm, ElGamal algorithm, public key exchange, attacks on RSA, attacks on digital signature.

Unit IV

Digital certificates ,private key management, public key cryptography standards, XML ,PKI & security,, internet security protocols, SSL,TSL,SHTTP, secure electronic Transaction, email, security, security in 3G, GSM,IEEE802.11,

Unit V

User authentication mechanism, Biometric authentication, Kerberos, Password, Authentication tokens, IP security overview & policy, Firewall characteristic, VPN, Malicious software,Intruder, Email security.

Books Recommended:

- [1]. Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education.Pearson Education, 2006.
- [2]. Atul kahate ; Cryptography & Network Security, Third edition ,McGraw hill education
- [3]. Behrouz A. Forouzan, Cryptography & Network Security, Tata McGraw hill, 2007.
- [4]. Matt Bishop ,“Computer Security art and science ”, Second Edition, Pearson Education, 2002.

Learning Outcomes:

At the end of this course, students will be able to:

- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures.
- Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations.
- Formulate research problems in the computer security field.

List of Practical Assignments:

- 1) Design and implementation of a simple client/server model and running application using sockets and TCP/IP.
- 2) To make students aware of the insecurity of default passwords, printed passwords and password transmitted in plain text.
- 3) To teach student how to use SSH for secure file transfer or for accessing local computer using port forwarding technique.
- 4) Comparison between Telnet and SSH for Secure Connection

S.No	Old Scheme		New(CRCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	2AM501	Applied Mathematics-III	ATR3C1	APPLIED MATHEMATICS-III	30%
2	2ET502	Digital Electronics	ETR3C2	DIGITAL ELECTRONICS	5%
3	2CO555	Data Structure	ETR3C3	DATA STRUCTURE	10%
4	2ET504	Circuit Analysis and Synthesis	ETR3C4	NETWORK ANALYSIS	0%
5	2ET505	Microelectronics	ETR3G1	ELECTRONIC DEVICES AND FABRICATION	10%
6	2SS007	Effective Communication Skills	STR3S3	EFFECTIVE COMMUNICATION SKILL	15%
7	2ET556	Electronic Workshop	ETR3L1	ELECTRONIC WORKSHOP-I	20%
8	2AM551	Applied Mathematics-IV			
9	2CO552	Digital Computer Organization	ETR4C1	COMPUTER ORGANIZATION AND ARCHITECTURE	40%
10	2ET503	Electrical and Electronic Measurement	ETR4C2	ELECTRICAL AND ELECTRONIC MEASUREMENT	10%
11	2ET553	Microprocessors & Assembly Lang. Prog.			
12	2ET554	Electromagnetic Field and Transmission Lines	ETR4C3	ANALOG ELECTRONICS	100%
13			ETR4C4	ANALOG COMMUNICATION	100%
14			ETR4G2	SIGNALS AND SYSTEMS	100%
15			STR4S4	ENGINEERING ECONOMICS	20%
16	2SS057	Engineering Economics	ETR4L2	ELECTRONIC WORKSHOP-II	100%
17					
Average % change in BE program = Total average / 4 =					10.00%
Average % change =					40%

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Academic Year: July-2017 to June-2018
 Programme: B.E. III Branch : Electronics and Telecommunication

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	3ET553	Object Oriented Systems	ETR5C1	OBJECT ORIENTED PROGRAMMING	0%
2			ETR5C2	DIGITAL COMMUNICATION	100%
3			ETR5C3	EMF AND TRANSMISSION LINE	100%
4	3ET504	Microcontrollers	ETR5E1	MICROCONTROLLERS	100%
5	3ET554	Digital Signal Processing	ETR5G3	DIGITAL SIGNAL PROCESSING	25%
6			ETR5L3	SOFTWARE WORKSHOP	100%
7	3SS506	Principles of Management	STR5S5	PRINCIPLES OF MANAGEMENT	5%
8	3ET502	Analog Communication Engineering			
9	3ET503	Analog Electronics			
10			ETR6C1	VLSI DESIGN	100%
11			ETR6C2	MOBILE AND WIRELESS COMMUNICATION	100%
12	3ET555	Control Systems	ETR6C3	CONTROL SYSTEM	5%
13	3ET505	Linear Devices and Application	ETR6E1	LINEAR INTEGRATED CIRCUITS	25%
14	3ET501	Computer Networks	ETR6G4	COMPUTER NETWORKS	5%
15	3ET556	Design Workshop	ETR6L4	DESIGN WORKSHOP	60%
16	3SS557	Entrepreneurship Development & IPR	STR6S6	ENTERPRENEURSHIP AND IPR DEVELOPMENT	30%
17	3ET558	Operating systems			
18	3ET552	Telecom Networks			
Average % change in BE program = Total average / 4 =					54%
Average % change =					13.50%

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Academic Year: July-2018 to June-2019
 Programme: B.E. IV Branch : Electronics and Telecommunication

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	4ET510	Project-I	ETR7C1	PROJECT PHASE-I	0%
2			ETR7C2	OPERATING SYSTEM	100%
3	4ET504	Antenna & Wave Propagation	EIR7C3	ANTENNA AND WAVE PROPOGATION	0%
4	4ET503	Microwave Engineering	EIR7C4	RF AND MICROWAVE ENGG.	30%
5	4ET551	Circuit Design Using HDL	EIR7E1	CIRCUIT DESIGN USING HDL	10%
6	4ET502	Digital communication			
7	4ET505	Wireless Communication			
8	4ET560	Project-II	ETR8C1	PROJECT PHASE-II	0%
9			EIR8C2	TELECOM NETWORKS	50%
10	4ET552	Optical Communication	EIR8C3	OPTICAL COMMUNICATION	30%
11	4ET554	Satellite Communication & Navigation Systems	EIR8C4	SATELLITE AND NAVIGATION SYSTEM	10%
12			ETR8E1	INTERNET OF THINGS	100%
13	4ET553	IC Design Techniques			
Average % change in BE program = Total average / 4 =					33%
Average % change =					8.25%

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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester III					
Subject Code & Name	Instructions Hours per Week			Marks					
2AM501 Applied Mathematics- III	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: The course aims at making the students familiar about some Special Functions, useful in particle physics, Spectral and Pseudo spectral approximations, Quantum optics etc., Markov Chains, useful in the field of statistics, physics, bioinformatics etc., Reliability, useful in quality control and material testing and the most basic numerical methods and concepts like error estimation, order of convergence, stability etc. helpful in various fields of engineering and science. Software like Matlab, MathCAD, Mathematica etc. can be used to simulate the results of various numerical methods.

Prerequisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and probability theory.

COURSE OF CONTENTS

Unit-I

~~**Series solution of ordinary differential equations:** Method of Frobenius. Series solution of Bessel and Legendre's differential equations.~~

~~**Special function:** Bessel's functions and Legendre's polynomials, their recurrence relations, generating functions and orthogonal properties.~~

Unit-II

Markov chain and stochastic process: Definition of Markov chain, Transition matrix, probability distribution in Markov chain, Multi-step in Markov chain.

Reliability: Basic concepts. Failure law, components in series and in parallel, Redundancy.

Unit-III

~~**Bivariate distributions:** Bivariate frequency distributions, Correlation coefficient of bivariate frequency distributions, Regression lines.~~

~~**Multivariate distributions:** Multiple and partial correlation. Equation of regression planes.~~

Unit-IV

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Direct iterative method, Graffe's root squaring method.

Solution of system of linear algebraic equation: Matrix inversion method, Gauss- elimination Method, Jordan's method, Crout's method. Gauss-Seidel iterative method.

Unit-V

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals. Divided differences and central differences.

Numerical differentiation and integration: Nu diff using Newton forward Backward & Divided diff & string formula Newton-Cote's formula, Gaussian quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.

BOOKS RECOMMENDED:

[1] Francis J. Scheid, Schaum's Outline of Numerical Analysis, McGraw-Hill, New York, 1989.

[2] Murray R. Spiegel and Larry J. Stephens, Schaum's Outline of Statistics, McGraw- Hill, New York: 1999.

[3] Hwei P. Hsu, Schaum's Outline of Probability, Random Variables, and Random Processes, McGraw-Hill, New York: 1997.

[4] Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.

[5] B.S.Grewal, Engineering Mathematics, Khanna Publishers, 12/e, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester III				
Subject Code & Name		Instructions Hours per Week			Credits			
ATR3C1: Applied Mathematics-III		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	-	3	1	-	4

Learning Objectives:

- To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like electromagnetic and electrostatic field theory, control theory, communication and signal processing, power transmission, design of discrete-(time) systems, circuit analysis etc.
- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Prerequisites: Basic knowledge of algebra of complex numbers, determinants, matrices, differentiation and integration of functions and probability theory.

Course Content

Unit-I

Function of Complex variables: Analytic functions, Cauchy's integral theorem and integral formulae, Taylor's and Laurent' series, Residue theorem, Solution of integrals.

Unit-II

Random variables, density function, stochastic process, autocorrelation, Markov chain, Multi-step in Markov chain. Basic concepts of reliability, failure laws, components in series and in parallel, Redundancy.

Unit-III

Interpolation: Finite difference operators, Newton's and Stirling's interpolation, Numerical differentiation, Numerical integration using Trapezoidal, Simpson's 1/3rd, Simpson's 3/8th and Weddle's rule.

Unit-IV

Numerical solutions of algebraic and transcendental equations -Bisection method, Regula-Falsi method, Newton-Raphson method, solution of system of linear algebraic equations-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.
Numerical Solutions of differential equations - single and multi-step methods.

Unit-V

Fourier series, sine and cosine series, change of intervals, continuous-time and discrete-time Fourier series, Fourier Integral.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply the concept of complex analysis, Fourier analysis and stochastic process in various subjects of engineering like electromagnetic and electrostatic field theory, control theory, signal processing, power transmission and so on.
- Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.

Books Recommended:

1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
3. Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
4. Kasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
5. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw - Hill Education, 2002.
6. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, John Wiley & Sons, 2006.
7. G. Paria, Statistics and Stochastic Processes Part II, Scholar's Publication, Indore.
8. A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
9. Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester III					
Subject Code & Name	Instructions per Week		Hours	Marks					
2ET502 Digital Electronics	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objective: Get acquainted with different number systems, their Interconversion and operations. Familiarized with different logic families & relative performance. Ability to design various combinational circuits by solving & reducing Boolean equations. Ability to synthesis, design and analysis of sequential circuits using Xilinx tools. Understandability of converting analog signal to digital and vice versa. Synchronization and frequency division circuits. Ability to test digital circuits and estimating reliability.

Prerequisite(s): Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE OF CONTENTS

Unit-I

Introduction to Binary System: Number System, Number base conversion, Binary Arithmetic, Various Binary codes, **Logic Families:** - RTL, DTL, ECL, IIL, TTL & CMOS families

Unit-II

Combinational Circuits: Combinations Logic, ~~Design principles, Analysis and Synthesis Tools & Techniques,~~ Combinational logic design practices like, ~~combinational PLDs, Decoders, Encoders, 3-state Devices,~~ Arithmetic Circuits like Adder, Subtractor, Multiplier, ~~Divider, Comparators for signed and unsigned numbers~~ **Practical Designing of combinations circuits design using EDA Software**

Unit-III

Sequential Circuits: Sequential Logic Design Practices: Latches and Flip-Flops, ~~Sequential PLDs, Counters, Shift Registers. Sequential Design Methodology, Impediments to Synchronous Design, Synchronizer Failure and Metastability. Sequential Circuit Design Examples Using EDA Software~~

Unit-IV

Registers: Shift Registers, Universal Shift Registers, ~~Shift Register Counter, Sequence Generators.~~ **Memory Devices:** Classifications, Static and Dynamic RAM, ROM, Memory Decoding & Expansion **CPLDs and FPGAs:** Xilinx family, function block architecture, programmable interconnects.

Unit-V

Digital Circuits:

Digital to Analog Conversions: ~~using Pulse width Modulator, Oversampling DAC, Binary Weighted DAC, R-2R Ladder, Thermometer Coded DAC, Segmented DAC, Hybrid DAC.~~ **Analog to Digital Conversions:** using ~~Direct Conversions, Successive Approximations, Delta Encoded, Ramp Compare, Pipeline Method, Sigma Delta methods. Counting and Timing Circuits: Using decade counters with & without feedback, vernier counting. Synchronization and Frequency division circuits: using sweep circuits, stable & Monostable Relaxation circuits, study of sine wave synchronization. Monostable, Bistable & Stable multivibrators: using 555, transistor. Testing of Digital Circuits: Tools, Design of Testability, Estimating Digital system Reliability, Transmission lines, reflections and termination.~~

BOOKS RECOMMENDED

- [1] John F. Wakerly, *Digital Design: Principles & Practices*, Low Price Edition, Pearson Education.2003
- [2] Richard F.Tinder, *Engineering Digital Design*, 2/e, Harcourt India Private Ltd., 2001
- [3] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [4] William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
- [5] Jacob Millman & Herbert Taub,*Pulse, Digitaland Switching Waveforms*,13th Reprint,Tata McGraw Hill Publishing Company Ltd.,NewDelhi, 1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C2 DIGITAL ELECTRONICS	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide student the knowledge of different number systems and conversion among them.
- Familiarize students with different logic families and characteristics of Digital ICs
- Familiarize students with different Combinational ICs.
- Develop skills to design various Combinational circuits
- Familiarize students with different Counter ICs
- Develop skills to design various Sequential circuits
- Develop ability to implement digital circuits in various practical applications.

Prerequisites:

Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE CONTENTS

Unit –I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's- speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

Unit-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices

Unit-III

Combinational & Sequential Circuits: Combinational circuit design for Adder, Subtractor, Comparator, Multiplier , various Code converters
Latches and Flip-Flop- SR, D, T, JK, Master-slave , Flip- Flop conversions.

Unit-IV

Counter and Registers: Synchronous counter, Asynchronous counter, Up-Down Counter, Shift Registers -serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register

Unit-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, DAC808 IC
Analog to Digital Conversions as Flash type, Counter type, Successive Approximations type
A/D converter, Specifications of A/D converters, ADC 804 and 808 IC, Schmitt trigger,
Monostable & Astable Multivibrator using IC555.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand driving capacity of a gate and voltage-current parameters.
- Implement digital circuit for arithmetic operations.
- Implement digital circuit with optimized hardware.
- Design and Analyse any combinational digital circuit
- Design and Analyse any sequential circuit
- Using analog to digital and digital to analog IC's for data conversion.
- Design circuit to generate clock and pulses of desired frequency.

BOOKS RECOMMENDED:

- [1] Mano M. Morris, “*Digital Design*”, 3rd edition, Pearson Education 2006.
[2] William H.Gothmann,”*Digital Electronics: An Introduction to Theory and Practice*,
Eastern Economy Edition , Prentice-Hall of India Private Limited,NewDelhi.,2001
[3] William I. Fletcher, “*An Engineering Approach to Digital Design*”, Pearson Education
[4] S Salivahan,S Arivazhagan "*Digital Circuit and Design*" Vikas Publication ,2013

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. To implement various gates using universal NAND/NOR ICs.
2. To Design and Implement various combinational circuits using gate ICs.
3. To Design and Implement various combinational circuits using Mux, D-Mux, Encoder, Decoder ICs.
4. To learn and analyze different Flip-Flops.
5. To Design and Implement various sequential circuits using Flip-Flop.
6. To learn and analyse Counter IC's.
7. To Design and Implement various sequential circuits.
8. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
9. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2CO555 Data Structures		L	T	P		TH	CW	S W	PR	Total
		4	-	2	Ma x	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objective: Use a different algorithm for proper representation of Data to achieve efficiency. To understand an arrangement of memory elements in one or more planes. Way of selection of section of memory and its associated registers used for temporary storage of information in which the item most recently stored is the first to be retrieved. To understand how to sequenced stored data or programs awaiting processing. Development of structure for organizing or classifying data in which every item can be traced to a single origin through a unique path. A Development of diagrams that exhibits a relationship, often functional, between two sets of numbers or procedures.

Prerequisite(s): Knowledge of language 'C' used for programming

COURSE OF CONTENTS

Unit-I

Array and Link list: Array: Definition, Representation, Address Calculations; Searching: Linear search, Binary search, ~~Hash Search~~; Sorting: Bubble sort, Insertion sort, Selection sort, Heap sort, Quick sort, Merge sort, Link List: Introduction, Single Link list, Single Circular link List, Doubly link list, ~~Doubly Circular link list~~.

Unit-II

Stack: Definition, Representations: static and dynamic, Infix, Prefix, and Postfix expressions, Conversion of Infix to Postfix, Evaluation of Postfix expression, Implementation of recursion, ~~removal of recursion~~.

Unit-III

Queue: Definition, Representations: Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, and Implementation of Priority Queue using Heap data structure, applications of queues.

Unit-IV

Tree: Definition, Basic terminology, Binary tree, Complete Binary Tree, ~~Full Binary Tree~~; representations: Static and dynamic, Traversing in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree, B⁺tree, B*tree.

Unit-V

Graph: Definition, Basic terminology, Directed and Undirected graph, Connected and Disconnected Graph, Weighted graph, Representations: static, dynamic and mix; Searching in graphs, finding shortest path in a weighted graph, Applications of graph.

BOOKS RECOMMENDED:

- [1] E Horowitz & Sahni, "Fundamental Data Structure", Galgotia Book Source, 1983.
- [2] A Tannenbaum, "Data Structure Using C", Pearson Education.
- [3] Kruz, "Data Strusture and Programming Design", 1987.
- [4] N. Wirth, "Algorithms +Data Structure = Program", Prentice Hall of India, 1979.
- [5] A V Aho, J E Hopcroft & J D Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C3 DATA STRUCTURE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	1	3	1	1	5

Learning Objectives:

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

Prerequisites:

Computer Programming knowledge, C Language

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations: static and dynamic, Implementation of stack, Applications of stack: Polish notation representation and conversion, Tower of Hanoi problem, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, Heap Sort, applications of queues. Hash Structures: Representation, Search and Implementation and other issues.

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Learn the basic types for data structure, implementation and application.

- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem.
- Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

- [1] E. Horowitz & Sahni, "Fundamental Data Structure", Galgotia Book Source, 1983.
 [2] A. Tannenbaum, "Data Structure Using C", Pearson Education, 2003.
 [3] Kruse, "Data Structure and Programming Design", Prentice Hall, 1987.
 [4] N. Wirth, "Algorithms + Data Structure = Program", Prentice Hall of India, 1979.
 [5] Goodrich & Tamassia, "Data Structures and Algorithms in C++", 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

During the learning of course, students need to carry out following assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queues & implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2ET504 Circuit Analysis & Synthesis		L	T	P		TH	CW	SW	PR	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: The objective of the course are to learn techniques of solving circuits with R,L & C elements. Circuits with independent & dependent sources. Dynamics of I and II order networks. Application of Laplace and Fourier transform in solving the circuits. Synthesis of RL, RC, RLC circuits.

Prerequisite(s): Basic course in Electrical.

COURSE OF CONTENTS

Unit-I

Circuit concept and Network Equation: Elements, Sources, their characteristics, source transformations, Kirchoff's law, node and loop analysis, D-Y transformation

Unit-II

Time domain analysis of circuits and Network Theorems: Transient and steady state analysis of first order and second order systems, initial conditions in networks, ~~Superposition, Reciprocity, Thevenin's, Norton's and Maximum Power Transfer Theorem.~~

Unit-III

Two Port Networks: Various network parameters, ~~their relationships interpretation of poles and zero, effect of their location in the complex plane,~~ two port parameters – z-parameter, y-parameter, transmission parameter and hybrid parameter.

Unit-IV

Laplace Transforms and Fourier analysis: Basic theorems for Laplace transform, solution of circuit problems using Laplace transform, Fourier analysis of complex waves, symmetries, introduction to Fourier transforms.

Unit-V

Network Synthesis: Synthesis of one port network, properties of LC immittances, foster realization of LC circuits, ladder development and Cauer forms, properties of RC immittances and synthesis of RC circuits.

BOOKS RECOMMENDED:

- [1] M.E.Van Valkenburg, *Network Analysis*, 3/e, Pearson Education.
- [2] Franklin F.Kuo, *Network Analysis and Synthesis*, 2/e, John Wiley & Sons, 2003
- [3] Donald Scott, *An Introduction to Circuit Analysis: A System Approaches*, Electrical Engineering Series, McGraw-Hill International Editions.,1987
- [4] T.S.K.V. Iyer, *Theory and Problem in Circuit Analysis*, TMH Outline Series, Tata McGraw-Hill Publishing Company Ltd, New Delhi.,2000
- [5] Gyanendra K.Mithal & Ravi Mithal, *Netwrok Analysis including Transmission Line*, 14/e, Khanna Publishers, New Delhi.,2001

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C4 NETWORK ANALYSIS	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To learn techniques of solving circuits involving different active and passive elements.
- To analyze the behavior of the circuit's response in time domain.
- To analyze the behavior of the circuit's response in frequency domain.
- To understand the significance of network functions.

Prerequisites: Basic course in Electrical Engineering.

COURSE CONTENTS

UNIT-I

Circuit fundamental and tools of analyzing Network: Elements, Sources, their characteristics, source transformations, Kirchhoff's law, node and loop analysis, D-Y transformation, Network Theorems: Superposition, Reciprocity, Thevenin's, Norton's, Millman and Maximum Power Transfer Theorem, Coupled circuits, Graph Theory

UNIT-II

Time domain analysis of circuits: Transient and steady state analysis of first order and second order systems, initial and final conditions in networks, Solution of I, II and Higher order differential equation

UNIT-III

Two Port Networks: Various network parameters, two port parameters – z-parameter, y-parameter, transmission parameter and hybrid parameter, relationships, Interconnection of two-two port networks, terminated two port network.

UNIT-IV

Laplace Transform and Fourier analysis: Basic theorems for Laplace transform, solution of circuit problems using Laplace transform, Waveform synthesis, Theorem in transform domain, Fourier analysis of complex waves, symmetries, introduction to Fourier transform.

UNIT-V

Network Synthesis: Network functions, significance of poles and zeros, Physical realizability condition, Hurwitz test, Synthesis of one port network, properties of LC immittance, foster realization of LC circuits, ladder development and Causer forms, properties of RC immittance and synthesis of RC circuits.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Understand the behavior of different circuits and their response using various circuit analysis tools and theorems

- Understand the analysis in time domain and frequency domain.
- Understand basic concepts regarding the system definition mathematically and associated network function.
- Understand the concept of Network synthesis.

BOOKS RECOMMENDED:

- [1] M.E.Van Valkenburg, “*Network Analysis*”, 3/e, Pearson Education.
- [2] Franklin F.Kuo, “*Network Analysis and Synthesis*”, 2/e, John Wiley & Sons, 2003
- [3] Donald Scott, “*An Introduction to Circuit Analysis: A System Approaches*, Electrical Engineering Series”, McGraw-Hill International Editions. 1987
- [4] T.S.K.V. Iyer, “*Theory and Problem in Circuit Analysis*”, TMH Outline Series, Tata McGraw-Hill Publishing Company Ltd, New Delhi. 2000
- [5] Gyanendra K.Mithal & Ravi Mithal, “*Network Analysis including Transmission Line*”, 14/e, Khanna Publishers, New Delhi., 2001

List of Practical Assignments:

During the learning of course, students need to do following assignments:

1. Introduction to various components used in circuit analysis laboratory.
2. Experimental verification of Kirchoff’s voltage law and Kirchoff’s current law.
3. Experimental verification of Thevenin’s theorem.
4. Experimental verification of Nortan’s theorem.
5. Experimental verification of Superposition theorem.
6. Experimental verification of Maximum Power transfer theorem.
7. Experimental verification of Reciprocity theorem.
8. Calculation of z-parameters for a two port network.
9. Calculation of y-parameters for a two port network.
10. Calculation of ABCD-parameters for a two port network.
11. Experimental verification for series and parallel interconnection of a two port network.
12. Transient response analysis of a first order and second order circuit.
13. Experimental verification for Fourier series.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2ET505 Microelectronics		L	T	P		TH	CW	SW	PR	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: To understand the fundamental laws behind the material preparations of semiconductors. To Develop & Analysis of laws behind the successful design of semiconductor devices. Understand fundamentals of Diodes, Special Diodes their functioning & behaviors. Explain the theory behind the integrated circuit fabrication. To understand the design & working principles for Power Diodes.

Prerequisite(s): Knowledge of Basic Electronics, Concept of Physics as per syllabus studied at Higher Secondary Level.

COURSE OF CONTENTS

Unit-I

Crystal Properties and Growth of Semiconductors: Semiconductor material, Crystal Lattices, Bulk Crystal Growth, Epitaxial Growth etc.

Quantum Mechanics: Physical models, Photoelectric Effect, Atomic Spectra, Bohr model. Probability and uncertainty principles, Schrödinger Wave equations, Potential Well problem, Tunneling.

Energy Bands and Charge carriers in semiconductors: Bonding forces and energy bands in Solids, Charge Carriers in semiconductors, Carrier Concentrations, Drift of Carrier in Electric and magnetic Fields, Invariance of the Fermi level at equilibrium.

Unit-II

Excess carriers in semiconductors: Optical Absorption, Luminescence, Carrier Lifetime and Photoconductivity, Diffusion of Carriers.

Junctions: Fabrications of p-n junctions, Equilibrium conditions, Forward and reverse biased junctions; steady state conditions, Reverse Bias Breakdown, Transient and AC conditions, Deviations from traditional theory, Metal Semiconductor junctions, Heterojunctions.

PN Junction Diodes: Junction Diode, Tunnel Diode, Photodiodes, Light emitting diodes and lasers.

Unit-III

Bipolar junction Transistors : Amplification and switching, fundamentals of BJT operation, BJT fabrication, Minority carrier distributions and Terminal currents, Generalized Biasing, Switching, Important effects like Drift, base narrowing, avalanche breakdown, injection level ; Base resistance and emitter crowding.

Field effect transistors: Junction FET, Metal Semiconductor FET, Metal Insulator Semiconductor FET.

Unit-IV

Integrated Circuits: Advantages of integration, types of integrated circuits, monolith and hybrid circuits, fabrication of monolithic circuits, monolithic device elements, and charge transfer devices, VLSI, Testing Bonding and Packaging.

Lasers: Stimulated Emission, The Ruby laser, other laser system like rare earth systems, gas lasers etc. Semiconductor laser

Unit-V

PNPN switching devices: Switching mechanism, semiconductor Controlled rectifier.

Negative conductance microwave devices: Transit time devices, Gunn Effect and related devices

BOOKS RECOMMENDED:

- [1] Ben G. Streetman & Sanjay Banerjee, *Solid State Electronic Devices*, 5/e, Prentice-Hall of India Private Limited, New Delhi
- [2] R.C. Jaeger & T.N. Blalock *Microelectronic Circuit Design*, 2/e, Tata-Mcgraw Hill publishing company Ltd, New Delhi. 2001
- [3] Allen Mottershed *Electronic Devices and circuits*, Prentice-Hall of India Private Limited, New Delhi. 1997

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3G1 ELECTRONIC DEVICES AND FABRICATION	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize the student with the principle of operation, analysis and design of Junction diode, Transistors and BJT amplifier circuits
- To understand the basic fabrication steps of semiconductor device manufacturing.
- To study basic principle of filter circuits.

Prerequisites:

Basic Electronics

COURSE CONTENTS

Unit I

Foundation: The Semiconductor in Equilibrium: Statistical Mechanics, Charge Carriers in Semiconductor, Dopant Atoms and Energy Levels, The Extrinsic Semiconductor, Statistic of Donors and Accepters, Charge Neutrality, Position of Fermi Energy Level.

Unit II

Carrier Transport Phenomena: Carrier Drift, Drift Current Density, Mobility Effect, Conductivity, Velocity Saturation, Diffusion Current Density, Total current density, Carrier Generation and Recombination, Quasi Fermi Level, Excess Carrier Life time.

Unit III

PN Junction: Basic Structure of PN Junction, PN Junction under Zero Bias, Built in Potential barriers, Electric Field, Space Charge Width, PN Junction Under Forward and reverse Bias, minority and majority carrier distribution, Space charge width and electric field in forward and reverse bias, Junction Capacitances, one sided Junctions, Junction breakdowns. PN Junction Current, Small Signal Model of PN Junction.

Unit IV

The Bipolar transistor: Bipolar principal of operation, the modes of operation, Minority carrier distribution, Low frequency Common Base Current Gain, nonideal effects, equivalent circuit models, Frequency Limitations, Current voltage characteristics, BJT as an Amplifier, Small Signal Operation and Models.

Unit V

Single Crystal Structure, Defects in silicon structure, specification of silicon wafer, Crystal growth, CZ method, Oxidation, Diffusion, Ion Implantation, Metallization, Lithography, Process steps for PN Junction Diode, BJT fabrication.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- Acquire Knowledge and understanding of Electronics Devices and its operation.
- Apply acquired knowledge in designing state of art circuits.
- Able to know the manufacturing steps for Electronics devices

BOOKS RECOMMENDED:

- [1]. Donald Neamen and Dhruves Biswas, “*Semiconductor Physics and Devices*”, Mc Graw Hill Education, 4e.
- [2]. Gouranga Bose, “*IC Fabrication Technology*”, Mc Graw Hill Education, Edition 2014.
- [3]. Adel S Sedra and Kenneth C. Smith, “*Microelectronics Circuits Theory and Application*”, Oxford, Edition Sixth.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches) Semester III					
Subject Code & Name	Instructions Hours per Week			Marks					
2SS007 Effective Communication Skills	L	T	P		TH	CW	SW	PR	Total
	2	-	-	Max	-	50	-	-	50
Duration of Theory Paper: Only Internal Tests				Min	-	25	-	-	25

Course Objectives: To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisite(s): Technical English

COURSE OF CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Why Communication is necessary?; Art of Communication.

Unit-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts; Telephone speaking skills and Cross-cultural communication skills

Unit-III

Listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

Unit-IV

Interviews: Points to be remembered as an interviewer or an interviewee; Commonly asked questions; Types of interviews; Do's and Don'ts.

Unit-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Non-verbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Note: *There shall be seminars and practice sessions by students.*

BOOKS RECOMMENDED:

- [1] P D Chaturvedi, P.D. & M Chaturvedi, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.
- [2] ICMR, *Business Communication*, Feb 2001.
- [3] J Davies, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education, 2006.
- [4] Lecture material given by the course teacher.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
STR3S3 EFFECTIVE COMMUNICATION SKILL	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisites: Technical English

COURSE CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Types of Communication; Art of Communication.

Unit-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts.; Telephone speaking skills and Cross-cultural communication skills

Unit-III

Fundamentals of public Speaking- **Speeches on topics of current concern**, listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

Unit-IV

Interviews: Points to be remembered as an interviewer or an interviewee; commonly asked questions; Types of interviews; Do's and Don'ts.

Unit-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Nonverbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Note: There shall be seminars and practice sessions by students.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Enhance the competency for Group discussion and Personal interviews.
- Prepare for GRE, GATE, and TOEFL etc.
- Develop their syntax, vocabulary and expression power.
- Comprehension power will increase by WPM (words per minute)

BOOKS RECOMMENDED:

[1] P D Chaturvedi, P.D. & M Chaturvedi, “*Business Communication: Concepts, Cases and Applications*”, Pearson Education, Singapore Pvt. Ltd, 2004.

[2] ICMR, “*Business Communication*”, Feb 2001.

[3] J Davies, “*Communication Skills: A Guide for Engineering and Applied Science Students, 2/e*” Pearson Education, 2006.

[4] Lecture material given by the course teacher.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
2ET556 Electronics Workshop	L	T	P		TH	CW	SW	PR	Total
	-	-	2	Max	-	-	50	50	100
Duration of Theory Paper: Nil				Min	-	-	25	25	50

Course Objectives: To understand the criterion selection of component for electronics design. Explain the theory behind the integrated Analog circuit fabrication. To understand the design & working principles for Power supplies. To Develop & Analysis of successful design of Electronics circuit

Prerequisite(s): Knowledge of Basic Electronics,

COURSE OF CONTENTS

Unit-I

Study of various types of components like ~~Resistors, Capacitors, Diodes, Transistor, Inductors, Power Component like Power diode, Power Transistor.~~ Study of different types of ~~cables, cable sockets, connectors, switches & relays.~~ From this study student will develop the familiarity of the component, their selection criterion, how to read the data tables etc.

Unit-II

~~Selection of solder, Soldering wires and fluxes. Techniques of Soldering~~

Unit-III

~~Types of PCBs, & selection of PCB, techniques of making PCB for projects and mass manufacturing, layout of components and precaution, electrical wiring diagrams elements of grounding and shielding PCB layout practice.~~

Unit-IV

~~Fabrication of power supplies. Study of various type of power supplies techniques~~

Unit-V

~~Student will develop the minor electronic project for the practices of above theory. During development of the project familiarity of different EDA tools will develop.~~

BOOKS RECOMMENDED

- [1] John R. Barnes, *Robust Electronic Design* Reference Book Volumes 1 and 2, Kluwer Academic Publishers, 2004
- [2] James W Nilsson, Susan Riedel, *Introduction to PSpice Manual: Electric Circuits: Using Orcad Release 9.1*, Oxford University Press 2006

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3L1 ELECTRONIC WORKSHOP-I	L	T	P	L	T	P	Total
	Duration of Theory Paper:	0	0	1	0	0	1

Learning Objectives:

This course gives the basic introduction of electronic hardware systems and provides hands-on training with familiarization, identification, testing, assembling, dismantling, fabrication and repairing such systems by making use of the various tools and instruments available in the Electronics Workshop.

Prerequisites:

None

COURSE CONTENTS

List Experiments

1. Familiarization/Identification of electronic components with specification: Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.
2. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpretation of data sheets of discrete components and ICs, Estimation and costing.
3. Familiarization/Application of testing instruments and commonly used tools : Multimeter, Function generator, Power supply, CRO etc. , Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.
4. Testing of electronic components: Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter.
5. Inter-connection methods and soldering practice. : Bread board, Soldering - types - selection of materials and safety precautions, soldering practices in connectors and general purpose PCB, Crimping.
6. Printed circuit boards (PCB) : Types, Single sided, Double sided, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching using Ferric chloride and drilling.
7. Assembling of electronic circuit/system on general purpose PCB, test and demonstration of functioning (Any Four circuits)
 - A. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, Zener/IC regulator.
 - B. LED blinking circuit using a stable multi-vibrator with transistor BC 107.
 - C. Square wave generation using IC 555 timer.
 - D. Sine wave generation using IC 741 OP-AMP.

E. RC coupled amplifier with transistor BC 107.

Learning Outcomes:

Student can identify the active and passive electronic components. Student gets hands-on experience on assembling, testing, dismantling, fabrication and repairing systems by making use of the various tools and instruments available in the Electronics Workshop.

BOOKS RECOMMENDED:

[1] R S Khandpur, “*Printed Circuit Boards - Design Fabrication, Assembly and Testing*”, Tata Mc Graw Hill Publishing Company Limited, 1st edition 2008.

[2] Horowitz and Hill, “*The Art of Electronics 2nd Edition*”, 1989/1990 Cambridge University Press

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2AM551 Applied Mathematics – IV		L	T	P		TH	CW	SW	PR	Total
		4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours					Min	35	25	-	-	60

Course Objectives: To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas in various branches of engineering like electromagnetic and electrostatic field theory, fluid dynamics, control, communication and signal processing, design of discrete (time) systems, circuit analysis etc.

Prerequisite(s): Algebra of complex numbers, integration, basic properties of functions.

COURSE OF CONTENTS

UNIT-I

Function of Complex variables: Analytic functions, Cauchy Riemann conditions, Harmonic functions, Conjugate functions and their applications.

Complex integral: Integration of complex functions, simply and multiply connected regions, Cauchy's integral theorem, Cauchy's integral formula, Singularities, Zeroes, Residues and Residue theorem.

Unit-II

Difference equation: Definition of difference equations, formation of difference equation.

Solution of difference equations: Solution of Homogeneous and non homogeneous difference equation with constant and variable coefficients using operator method and generating functions. Simultaneous difference equation.

Unit-III

Laplace transform: Definition and properties of Laplace transform, Inverse Laplace Transforms. Convolution theorem.

Application of Laplace transform in solution of ordinary differential equations:

Solution of ordinary differential equations with constant and variable coefficients. Simultaneous differential equations with constant coefficients.

Unit-IV

Z-transform: Definition and properties of Z-transform, Convergence of Z-transforms, Evaluation of inverse Z-transforms. Convolution theorem.

Application of Z-transform in solution of difference equations: Solution of difference equations with constant coefficients.

Unit-V

Fourier transform: Fourier Integral and Fourier transforms, Fourier sine and cosine transforms, Finite Fourier sine and cosine transform.

Application of Fourier transform in solution of partial differential equations:

Solution of partial differential equations with constant and variable coefficients.

RECOMMENDED BOOKS:

- [1] Murray R. Spiegel, Schaum's Outline of Complex Variables, McGraw Hill, New York, 1968.
- [2] Murray Spiegel, Schaum's Outline of Theory and Problems of Advanced Mathematics for Engineers and Scientists, McGraw Hill, New York, 2002.
- [3] A. R. Vasishtha & Dr. R. K. Gupta, Integral Transform, Krishna Prakashan Mandir, Meerut, 21/e, 2003.
- [4] Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw Hill, New York, 2004.
- [5] B.S.Grewal, Engineering Mathematics, Khanna Publishers, 12/e, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
2CO552 Digital Computer Organization	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: Designing an ALU, instruction format, analyzing addressing methods and performance. Understanding control unit designing and ability to represent and operate on numbers. Understanding I/O device handling and bus arbitration issue. Ability to analyze performance issues of different memories. Enhancing and analyzing computer performance by pipelining and multiprocessor concept.

Prerequisite(s): Fundamental knowledge of computer system and peripherals, number system, digital electronics

COURSE OF CONTENTS

Unit-I

Computer Structure Overview, Addressing Methods & Program Sequencing

Overview, Operational Concepts, hardware- Software, Performance, Addressing Methods – Memory locations, Addresses & Encoding of Information, Main Memory Operations. Instruction Sequencing – Straight line Sequencing, Branching. Addressing Modes, Basic I/O Operations, Stack and Queues, Subroutines etc.

Unit-II

The Processing Unit and arithmetic operations

Processor Organization, Operational Concepts, Instruction Execution, Hardwired Control, ~~Microprogram Control~~ ~~Microinstructions~~, ~~Microprogram Sequencing~~, RISC and CISC, integer and floating point representation, signed-unsigned numbers and operations

Unit-III

Input-Output Organization and bus structure

I/O Device Access Methods, Interrupt Handling, Device Handling, Exception Handling, Direct Memory Access, interrupt controller, daisy chaining, parallel, priority interrupt, I/O Interfaces Bus structure, bus design issues, Synchronous –Asynchronous bus, bus arbitration

Unit-IV

Memory System

Memory hierarchy, primary-secondary memory operational Concepts and different types as RAM-ROM and their variations, hard disk, floppy, RAID, CD, DVD etc. Cache Memory - Mapping, Replacement Algorithms, Types. Performance Considerations etc.

Unit-V

Pipelining and Parallel computer architecture

~~Pipelining~~ Operational Concepts, Data Dependency etc., design issues for parallel computer, classification, array processor, vector processor, shared memory processors, UMA, NUMA, COMA, interprocessor arbitration

BOOKS RECOMMENDED:

- [1] V. Hamacher, S. Zaky, *Computer Organization*, Mcgraw Hill International, Fifth Edition.
- [2] William Stallings, *Computer Organization and Architecture*, Pearson Education, Sixth Edition.
- [3] A. Tannenbaum, *Structured Computer Organization*, Pearson Education, 2002.
- [4] Patterson & Hennessy, *Computer Organization and Design*, Morgan Kaufmann, Third Edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C1 COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.
- To identify the elements of modern instructions sets and their impact on processor design To explain the function of each element of a memory hierarchy,
- To identify and compare different methods for computer I/O.

Prerequisite(s): Knowledge of logic circuits - combinational and sequential

COURSE CONTENTS

Unit I: Computer Organization

Computer types, Structure with basic computer components, Function in brief with instruction fetch and execute, Interrupts and I/O communication, Interconnection structure, bus interconnection, Multiple Bus hierarchies, Elements of bus design Performance metrics and measurement

Unit II: Computer Memory System

Characteristics of memory system, Memory hierarchy, Cache Memory- Cache memory principles, Elements of cache design- cache address, size, mapping functions, replacement algorithms, write policy, Internal Memory- semiconductor memory, External Memory- Hard Disk organization, RAID

Unit III: Input and Output System

I/O modules- Module function and I/O module structure, Programmed I/O , Polling I/O, Interrupt driven I/O , DMA function, Synchronous and Asynchronous serial data communication, Computer peripherals like keyboard, mouse, printer, scanner and display devices

Unit IV: Processor Organization

Evolution of Intel processor architecture- 4 bit to 64 bit, Control unit Hardwired and micro programmed, concept of pipelining , Study of microprocessor 8085, Functional pins and Register organization, Memory mapped I/O and I/O mapped I/O schemes,

Unit V: Instruction Set and Assembly Language Programming

Addressing modes and Formats- immediate, direct, indirect, register, register indirect, displacement and stack, Instruction Cycle machine cycle and Data flow, 8085 instruction set and assembly programming, Time delay concept , stack and subroutines, Interrupt handling, Instruction set architecture RISC and CISC

Learning Outcomes:

On completion of the course, student will be able to :

- Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
- Analyze the performance of commercially available computers.
- To develop logic for assembly language programming

BOOKS RECOMMENDED

[1] William Stallings, “*Computer Organization and Architecture*”, Prentice Hall of India, Sixth Edition.

[2] A. Tannenbaum, “*Structured Computer Organization*”, Pearson Education, 2002.

[3] Patterson & Hennessy, “*Computer Organization and Design*”, Morgan Kaufmann, 2007

[4] Ramesh S. Gaonkar, “*Microprocessor, Architecture, Programming, and Applications with the 8085*”, Penram International Publication, 5/e

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2ET503 Electrical and Electronic Measurements		L	T	P		TH	CW	SW	PR	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: Hours		3			Min	35	25	25	25	110

Course Objective: The objective of the course is to learn about design of various measuring instruments. Basic of R,L & C measurement. Concepts of measurement of voltage, current & power. Study & working of CRO and its type. Principles of AC bridges. High Frequency measurement, Working of Digital instrument.

Prerequisite(s): Basic course in Electronics & Electrical

COURSE OF CONTENTS

Unit-I

Basic concept of Measurements and Instruments, Measurement Methods, Generalized measurement System, Classification of Instruments, Static & Dynamic Characteristics, Errors & Uncertainty Measurement of system, Linear & Non-linear Systems.

Unit-II

Operation principles of Analog Instruments - Moving coil, Moving iron, PMMC, Dynamometer and Induction type instruments, Measurement of Voltage, Current, Power, Power Factor, Energy, Instrument Transformer - current and potential transformer, Measurement of Phase & Frequency.

Unit-III

Measurement of Resistance- low, medium and high resistance measurement, A.C. Bridges-general equation, Maxwell's bridge, Maxwell's capacitance bridge, Anderson bridge, Hay's bridge, Owen's bridge, De Sauty's bridge, Schering bridge, Potentiometer- DC potentiometer, Multi-range potentiometer, AC potentiometer and their applications, High Frequency Measurement- measurement of R,L,C at high frequency , Twin T & Bridge Networks, Q-meter and its applications.

Unit-IV

~~Analog & Digital Comparison, Electronic Voltmeters, Digital Voltmeters,~~ Construction & working of Basic CRO, its Components, Types of CRO, Special types of CRO, Types of CRO Probes.

Unit-V

Signal Generator, Function Generator, Wave Analyzer, Distortion Analyzer, Spectrum Analyzer, Frequency Counter, Display Devices & Recorders.

BOOKS RECOMMENDED:

- [1] A.K.Sawhney & Puneet Sawhney, *A Course in Electrical And Electronic measurements and Instrumentation*, 7/e, Dhanpat Rai & Co.(P) Ltd.,2005
- [2] Albert D.Helfrick & William D.Cooper, *Modern Electronic Instrumentation and measurement Technique*, Low Price Edition, Pearson Education, 2005
- [3] Ernest O.Doebelin, *Measurement Systems Application and Design*, 5/e, Tata McGraw –Hill Publishing Company Ltd., 2004
- [4] H.S.Kalsi,*Electronic Instrumentaion*, Technical Education Series, Tata McGraw –Hill Publishing Company Ltd.,2001
- [5] Alan S.Morris,*The Essence of Measurement*, Eastern Economic Edition, Prentice Hall of India Private Limited.,1997

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C2 ELECTRICAL AND ELECTRONIC MEASUREMENT	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

- To introduce students to monitor, analyze and control any physical system.
- To understand students how different types of meters work and their construction.
- To provide a student a knowledge to design and create novel products and solutions for real life problems.
- To introduce students a knowledge to use modern tools necessary for electrical projects.

Prerequisites(s): Basic Electrical Engg and Basic Electronics

COURSE CONTENTS

UNIT-I

Basic concept of Measurements and Instruments, Measurement Methods, Generalized measurement System, Classification of Instruments, Static & Dynamic Characteristics, Errors & Uncertainty measurement of system, Linear & Non-linear Systems.

UNIT-II

Operation principles of Analog Instruments - Moving coil, Moving iron, PMMC, Dynamometer and

Induction type instruments, Measurement of Voltage, Current, Power, Power Factor, Energy, Instrument Transformer - current and potential transformer, Measurement of Phase & Frequency.

UNIT-III

Measurement of Resistance- low, medium and high resistance measurement, A.C. Bridges-general equation, Potentiometer- DC potentiometer, Multi-range potentiometer, AC potentiometer and their applications, High Frequency Measurement , Twin T & Bridge Networks, Q-meter and its applications.

UNIT-IV

Display Devices I- Construction & working of Basic CRO, its Components (Deflection plates, Screen, Aquadag, Time Base Generator, Oscilloscope Amplifiers), Measurements of phase and frequency (Lissajous Patterns), Types of CRO, Special types of CRO, Types of CRO Probes.

UNIT-V

Display Devices II- Digital Voltmeter (ramp type DVM, Integrating and Potentiometric type DVMs, Signal Generator, Function Generator, Wave Analyzer, Distortion Analyzer, Spectrum Analyzer, Frequency Counter, Display Devices & Recorders.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R, L, C, Voltage, Current, Power factor, Power, Energy.
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.
- Ability to use Digital voltmeters

BOOKS RECOMMENDED:

[1] A.K.Sawhney & Puneet Sawhney, “A Course in Electrical and Electronic measurements and

Instrumentation”, 7/e, Dhanpat Rai & Co.(P) Ltd.,2005

[2] Albert D.Helfrick & William D.Cooper, “Modern Electronic Instrumentation and measurement Technique”,Low Price Edition, Pearson Education, 2005

[3] Ernest O.Doebelin, “Measurement Systems Application and Design”, 5/e, Tata McGraw – Hill Publishing Company Ltd., 2004

[4] H.S.Kalsi, “Electronic Instrumentaion”, Technical Education Series, Tata McGraw –Hill Publishing Company Ltd.,2001

[5] Alan S.Morris, “The Essence of Measurement”, Eastern Economic Edition, Prentice Hall of India Private Limited.,1997

List of Practical Assignments:

1. To calibrate test Ammeter with reference Ammeter and hence detection of deviation of the test ammeter from reference ammeter using comparison method.
2. To calibrate test Voltmeter with reference Voltmeter and hence detection of deviation of the test Voltmeter from reference Voltmeter using comparison method.
3. To calibrate test Wattmeter with reference Wattmeter and hence detection of deviation of the test Wattmeter from reference Wattmeter using comparison method.
4. To calibrate test Energy meter with reference Energy meter and hence detection of deviation of the test Energy meter from reference Energy meter using comparison method.
5. To study Hay’s Bridge and hence determination of unknown value of Self Inductance of given coil using Hay’s Bridge.
6. To study Anderson Bridge and hence determination of unknown value of Self Inductance of given coil using Anderson Bridge.
7. To study Schering’s Bridge and hence determination of unknown value of Capacitance of given coil using Schering’s Bridge.
8. To study Maxwell’s Bridge and hence determination of unknown value of Inductance of given coil using Maxwell’s Bridge.
9. To study Wien’s Bridge and hence determination of unknown value of Capacitance of given coil using Wien’s Bridge.
- 10.To study De Sauty Bridge and hence determination of unknown value of Capacitance of given coil using De Sauty Bridge.
- 11.To study Kelvin’s Bridge and hence determination of unknown value of very low resistance of given coil using Kelvin’s Bridge.
- 12.To study the construction detail of CRO including measurement of voltage, Phase and frequency with the help of CRO.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2ET553 Microprocessor & Assembly Language Programming		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objective: To provide the fundamentals of microprocessor 8085, its assembly language programming and the concept of Interfacing, peripheral chips.

Prerequisite(s): Knowledge of following concepts is required: Number Systems (binary, octal, and hexadecimal) and their conversions; Boolean algebra, logic gates, flip-flops, and registers; Concepts in combinational and sequential logic.

COURSE OF CONTENTS

Unit-I

Comparison among microprocessor microcontroller and computer. Introduction to 8085 microprocessor: Pin diagram, architecture, programming model, instruction set, classification of instruction set, instruction and data format, timing diagram of instructions. Basic concept of programming

Unit-II

Addressing modes. Counters and time delay. Stack and subroutine. Code conversion, BCD arithmetic, and 16 bit data operation. Programming Techniques. Basic interfacing concept, memory interfacing. Memory mapped and peripheral mapped I/O techniques.

Unit-III

The 8085 Interrupts, Input /output interfacing, interfacing data converters, 8259 interrupt controller.

Unit-IV

Programmable interfacing devices, The 8155 multipurpose programmable device, The 8255 programmable peripheral interface, The 8253/8254 programmable interval timer.

Unit-V

8237/8257 DMA controller. 8279 keyboard/display interface. Serial I/O and data communication using RS-232C serial I/O standard. The 8251 (USART) programmable communication interface.

BOOKS RECOMMENDED:

- [1] R S Gaonkar, *Microprocessor, Architecture, Programming, and Applications with the 8085*, Penram International Publication, 5/e
- [2] P.K. Ghosh and P. R. Sridhar, *0000 to 8085 Introduction to microprocessor for Engineers and Scientists*, PHI, 2/e
- [3] Douglas v. hall, *Microprocessor and interfacing programming and Hardware*, Tata McGraw Hall, 2/e
- [4] N.K. Srinath, *8085 Microprocessor Programming and Interface*, PHI, 2005.
- [5] M. Rafiauzzaman, *Microprocessor Theory and application :Intel and Motorola*, PHI, Revised Edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2ET554 Electromagnetic Field and Transmission lines		L	T	P	TH	CW	SW	PR	Total	
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: To Understand Mathematical foundations for more advanced courses in Electromagnetic like Antenna, Microwave etc. To understand system of material boundaries in the form of a solid dielectric rod or dielectric-filled tubular conductor. Capable of guiding high-frequency electromagnetic waves. To understand the successive or alternate changes in attributes or qualities, due to variation in Electric & Magnetic fields. Calculate various parameters required in designing of RF networks.

Prerequisite(s): In-depth knowledge of Advanced Mathematics Taught in the curriculum of engineering.

COURSE OF CONTENTS

Unit-I

Vector algebra: scalars & vectors, Position, distance vectors, vector multiplication, component of vector, co-ordinate system and transformation.

Cartesian co-ordinates: Circular, Cylindrical, Spherical & constant co-ordinates. Surface vector calculus: differential length area, volume. Line surface and volume integrals, Del operator gradients, divergence of vector and Divergence theorem, curl of vector and stokes theorem, Laplacian of scalar classification of vector fields.

Unit-II

Electrostatic fields: Coulomb's law and field intensity, electric field due the continuous charge, distributions electron flux density Gauss and Maxwell's Equations, Application of Gauss law, Electric potential, relation between E & V Maxwell's equations, An electric dipole and flux lines Energy density in Electrostatic fields, Electric Fields in material space: Properties of material convection and conduction current, conduction polarization in dielectric constant and strength, linear isotropic and homogenous dielectric, continuity equations and relaxation time, boundary conditions, procedure for solving the Poisson's or Laplace equation, resistance and capacitance, methods of images.

Unit-III

Magenetostatic fields: Biot Savart law, ampere circuit law-Maxwell's equations, Maxwell's equation for static fields application of Ampere's law, magnetic flux density—Maxwell's equation, Maxwell equation for static fields, magnetic scalar and vector potential, divergence of Biot Savart's law and Ampere's Law, magnetic force, materials and devices, force due the magnetic fields, magnetic torque and movement, a magnetic dipole, magnetization in materials, classification of a magnetic materials, magnetic boundary condition, inductors and inductance, magnetic energy, magnetic circuits, force on magnetic materials.

Unit-IV

Maxwell's' equation, Faraday's law, transfer and motional electromotive force, displacement current, Maxwell's equation in final forms, time varying potentials, time harmonic fields, EMW propagations wave in general, EMW in lossy dielectric, lossless dielectrics, free space, good conductors Power and pointing vector, reflection of plane wave on normal and oblique incidence.

Unit-V

Transmission lines: Parameters and equations, input impedance, SWR, Power, Smith chart, application of transmission lines, transients on transmission lines.

~~Waveguide: rectangular, TE, TM modes, Wave Propagation in guide, power transmission and attenuation, waveguide current and mode excitation, Resonators.~~

BOOKS RECOMMENDED:

- [1] Mathews N.O.Sadiku, *Elements of Electromagnetics*, 4/e, Oxford University Press, 2006
- [2] David K.Cheng, *Field and Wave Electromagnetics*, 2/e, Pearson Education Asia, 2003
- [2] John D.Kraus & Daniel A. Fleisch, *Electromagnetics and Applications*, 5/e, McGraw-Hill international Editions. Electrical Engineering Series, 1999
- [3] William H.Hayt, Jr. & John A.Buck, *Engineering Electromagnetics*, 7/eTata McGraw Hill Publishing Company Ltd.New Delhi. 2006
- [4] G.S.N.Raju, *Electromagnetic Field Theory & Transmissions Line*, First Indian Print, Pearson Education, 2005
- [5] Edward C.Jordan & Keith G.Balmain, *Electromagnetic Waves and Radiating System*, 2/e, Prentice Hall of India Private Ltd., 2001

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C3 ANALOG ELECTRONICS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To recall various BJT parameters, connections and configurations.
- To Explain and Demonstrate BJT Amplifier, Hybrid Equivalent and Hybrid Models.
- To explain construction and characteristics of JFETs and MOSFETs.
- To explain various types of FET biasing, and demonstrate the use of FET amplifiers.
- To Demonstrate and Construct Frequency response of BJT and FET amplifiers at various frequencies.
- To Define, Demonstrate and Analyze Power amplifier circuits in different modes of operation.
- To Demonstrate and Apply Feedback and Oscillator circuits using FET.

Prerequisites: Basic knowledge and understanding of semiconductor devices and operation required.

COURSE CONTENTS

Unit I

BJT AC Analysis: BJT AC Analysis:

BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration. Darlington connection-DC bias; The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit Fixed bias, Voltage divider, Emitter follower configuration; Complete Hybrid equivalent model, Hybrid π Model.

Unit II

Field Effect Transistors:

Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET.

FET Amplifiers:

JFET small signal model, Fixed bias configuration, Self-bias configuration, Voltage divider configuration, Common Gate configuration. Source-Follower Configuration, Cascade configuration.

Unit III Logarithms, Decibels, Low frequency response – BJT Amplifier with RL, Low frequency response FET Amplifier, Miller effect capacitance, High frequency response – BJT Amplifier, High frequency response-FET Amplifier, Multistage Frequency Effects.

Unit IV

Feedback and Oscillator Circuits:

Feedback concept, Feedback connection types, Voltage Series, Voltage Shunt, Current Series, Current Shunt, practical feedback circuit Phase shift oscillator, Wien bridge oscillator, Colpitts Oscillator, Hartley oscillator, Crystal

Unit V

Power Amplifiers:

Definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation and circuits, Amplifier distortion, Class C and Class D amplifiers. Voltage regulators: Discrete transistor voltage regulation - Series and Shunt Voltage regulators.

Learning Outcomes: After studying this course, students will be able to:

- Acquire knowledge of and Working principles, characteristics and basic applications of BJT and FET.
- Single stage, cascaded and feedback amplifier configurations and Frequency response characteristics of BJT and FET.
- Analyze the performance of FET amplifier in CS configuration and Power Amplifiers and Oscillator circuits.
- Interpretation of performance characteristics of transistors amplifiers, frequency Response and Oscillators.
- Apply the knowledge gained in the design of transistorized circuits, amplifiers and Oscillators.

BOOKS RECOMMENDED

- [1].Adel S. Sedra and Kenneth C. Smith, “*Micro Electronic Circuits Theory And Application*,” 5th Edition ISBN:0198062257
- [2].Behzad Razavi, “*Fundamentals of Microelectronics*”, John Wiley ISBN 2013 978-81-265-2307-8
- [3].J.Millman & C.C.Halkias,”*Integrated Electronics*”, 2nd edition, 2010, TMH. ISBN 0-07-462245-5

[4].K. A. Navas, “*Electronics Lab Manual*”, Volume I, PHI, 5th Edition, 2015, ISBN: 9788120351424.

List of Practical Assignments:

1. Realize BJT Darlington Emitter follower with and without bootstrapping and determine the gain, input and output impedances.
2. Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain bandwidth product from its frequency response.
3. Plot the transfer and drain characteristics of a JFET and calculate its drain resistance, mutual conductance and amplification factor.
4. Design, setup and plot the frequency response of Common Source JFET/MOSFET amplifier and obtain the bandwidth.
5. Plot the transfer and drain characteristics of n-channel MOSFET and calculate its parameters, namely; drain resistance, mutual conductance and amplification factor.
6. Set-up and study the working of complementary symmetry class B push pull power amplifier and calculate the efficiency.
7. Design and set-up the RC-Phase Shift Oscillator using FET, and calculate the frequency of output waveform.
8. Design and set-up the following tuned oscillator circuits using BJT, and determine the frequency of oscillation. (a) Hartley Oscillator (b) Colpitts Oscillator
9. Design and set-up the crystal oscillator and determine the frequency of oscillation

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics & Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4C4 ANALOG COMMUNICATION	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- The fundamentals of signals & linear time invariant systems used in communication systems.
- Knowledge of probability, random variables & random processes
- In depth knowledge of different types of analog communication system and different modulation techniques used in these systems.
- Analysis of noise and its impact on different modulation techniques.

Prerequisite(s): Basic Electronics

COURSE CONTENTS

Unit-I

Signals and Systems: Types of signals, Classification of Systems, Fourier series, Fourier transform & Its Properties, Convolution, Signal transmission through LTI Systems, Auto correlation, Cross correlation, Energy and power spectral density.

Probability, Random Variables & their moments, their significance, Gaussian & Rayleigh Probability density functions, their means and variances, Q-Function, Central limit theorem.

Unit -II

Amplitude Modulation: Need of Modulation, Block schematic of a typical communication system. AM modulation system, Modulation index, Generation (Squire Law & Switching Modulator) & Detection (Envelope & Squire Law Detector) of AM wave , Side bands & Power contents in AM Wave, DSB-SC (Balanced, Ring Modulator & Synchronous Detector), SSB-SC, Methods of generation & detection, VSB modulation, Comparison of various AM systems, Frequency division multiplexing, Group delay & phase delay.

Unit -III

Frequency Modulation: Relationships between Phase & Frequency Modulation, Narrowband FM, Wideband FM & their Spectrum, Transmission bandwidth of FM And PM signals, Methods of generation (Direct & Indirect) & detection of FM (Discriminators : Balanced, Phase Shift And PLL Detector), Pre- Emphasis & De-Emphasis, Stereophonic FM Broadcasting.

Unit -IV

AM transmitter block diagram, TRF receiver & its limitations, Necessity of heterodyning, Super heterodyne radio receivers, IF amplifiers & selection of IF. FM transmitters, FM receivers, AGC, AVC, AFC, Dynamic Range of Receivers.

Unit -V

Random & Gaussian processes and their frequency domain analysis, Sources of noise, Noise figure and Noise figure of amplifiers in cascade, Noise bandwidth, Effective noise temperature, and quadrature components of noise, Rician noise as narrow band Gaussian noise. Performance of AM, FM in presence of low noise case.

Introduction to Digital Communication: Nyquist Sampling Theorem, Time division Multiplexing, PAM, PWM, PPM.

Learning Outcomes:

On Completion of this course the students will be able to:

- Analyze analog communications in time domain and frequency domain.
- Distinguish between different analog modulation techniques.
- Understand the importance of noise considerations in communication systems.

BOOKS RECOMMENDED:

- [1] Proakis and Salehi, “*Fundamentals of Communication Systems*”, 1/E Pearson Education, 2005.
[2] Lathi B.P., “*Analog and Digital Communication systems*”, 3/E Oxford Press, 2007.
[3] Haykin Simon, “*Communication Systems*”, 4/E John Willey & Sons, 2006.
[4] Carlson, “*Communication Systems*”, 5/E McGraw Hill, 2004.
[5] Taub & Schilling, “*Principles of communication systems*”, 3/E McGraw Hill, 2000.
[6] Singh R.P. & Sapre, “*Communication systems Analog & Digital*”, 2/E TMH, 2007.

List of Practical Assignments:

1. To Perform the fourier synthesis of the following signals
 - a) Square wave
 - b) Triangular wave
 - c) AM wave SC
 - d) AM wave FC
2. Generation of AM Waveforms.
 - a) Waveforms generation of DSB-SC Amplitude modulation System
 - b) Waveforms generation of SSB-SC Amplitude modulation System
 - c) Waveforms generation of AM-FC System for different modulation index
3. To study the working of AM receiver.
 - a) (a)Detection of AM wave by envelope detector
 - b) (b)Detection of AM wave by square law detector
4. Receiving of AM signal using superhetrodyne receiver and analyzes it.
5. To modulate a message signal using FM modulator.
6. To demodulate a received FM signal using FM demodulator circuit.
7. To study the working of pulse width modulator and demodulator.
8. To study the working of pulse amplitude modulator and demodulator.
9. To study the working of pulse position modulator and demodulator.
10. To study the working of spectrum analyzer. Analyzing the different AM and FM waveforms on spectrum analyzer.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics & Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR4G2 SIGNALS AND SYSTEMS	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course aims to provide detailed description Signals and System Analysis. Fourier series and Fourier transform, Laplace and Z Transform along with respect to SISO systems and State variable analysis for MIMO systems.

Prerequisite(s): Engineering Mathematics

COURSE CONTENTS

UNIT-I Fundamentals of Signals & Systems:

All basic Continuous time signals. Energy signal and Power signal. Continuous time systems, discrete time signals and discrete time systems. Linear Time invariant system theory and its significance to continuous time and discrete time system analysis. Linear convolution Integral and Linear convolution sum.

UNIT-2 Fourier series and Fourier Transform:

Fourier series, Different forms of Fourier series, Dirchlet conditions, Wave symmetry, Parseval theorem. Fourier Transform; its properties and applications. Symmetry properties of Fourier transform. System analysis with Fourier transform. Ideal Filters.

UNIT-3 Laplace Transform and its applications:

Laplace Transform and its properties. Region of convergence, Laplace Transform of some common functions, Initial value and Final value theorem. Inverse Laplace Transform, Transfer function, Characteristics of transfer function, Poles and Zeros, System analysis using Laplace Transform.

UNIT-4 State Variable Techniques:

Introduction, State Variable Concept, Form of state equations, State space representation of continuous time and discrete time LTI systems, solution of state equation, state transition matrix.

UNIT -5 Discrete Time Signal/Systems and Z-Transform:

Introduction, Z-Transform definition, Region of Convergence, Z-Transform of some common sequences, properties of Z-Transform, Inverse Z-Transform, System function of discrete time, LTI Systems, Convolution Theorem, Complex Convolution Theorem.

Learning Outcomes:

On Completion of this course the students will be able to:

- The focus of this course is to familiarize the students with the concept of Fourier transform & Fourier series.
- Analyze the spectral characteristics of signals using Fourier analysis.
- Classify systems based on their properties and determine the response of LTI
- Identify system properties based on impulse response and Fourier analysis.
- Apply transform techniques to analyze continuous-time and discrete-time

BOOKS RECOMMENDED:

- [1] Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin, “*Signals and Systems*”, Pearson 4th Edition
- [2] Hwei P. Hsu (Schaum's Outline Series), “*Signals and Systems*”, TMH Edition
- [3] A. Anand Kumar, “*Signals and Systems*”, PHI 3rd Edition
- [4] A.V. Oppenheim et al, “*Signals and Systems*”, 2nd Edition, Pearson 2003
- [5] Smarajit Ghosh, “*Signals and Systems*”, Pearson
- [6] Simon Haykin, “*Signals and Systems*” 2nd edition, Wiley, 2008.
- [7] B P Lathi, “*Digital and Analog Communication Systems*” 4th edition, Oxford University Press, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
2SS057 Engineering Economics	L	T	P		TH	CW	SW	PR	Total
	2	-	-	Max	-	50	-	-	50
	Duration of Theory Paper: Only Internal Tests			Min	-	25	-	-	25

Course Objectives: To make fundamentally strong base for decision making skills by applying the concepts of economics and accounting to cope up with the current dynamic business environment

Prerequisite(s): Nil

COURSE OF CONTENTS

Unit-I

Engineering Economics

Economic Decision: Role of Engineering in Business; Concept, Nature and Scope of Economics & Business Economics; Types of Business Organizations.

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-II

National Income

Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-III

Consumer Demand

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-IV

Production Supply

Production Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-V

Liberalization

~~Liberalization, Globalization & Privatization: Concept & Characteristics; Evaluation of New Liberal Economic, Policy of India; Economy through Globalization.~~

BOOKS RECOMMENDED:

[1] C S Park, *Contemporary Engineering Economics*, Pearson Education, 2002

[2] J S Chandan, *Statistics for Business and Economics*,

[3] C Dislis, JH Dick, I D Dear & AP Ambler, *Test Economics and Design for Testability*,

[4] S Damodaran, *Managerial Economics*.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV				
Subject Code & Name		Instructions Hours per Week			Credits			
STR4S4: Engineering Economics		L	T	P	L	T	P	Total
		2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours								

Learning Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

Course Contents

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.
Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale
Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.

- Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.
- Solve economical problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

Books Recommended:

[1] C S Park, Contemporary Engineering Economics, Pearson Education, 2002.

[2] J S Chandan, Statistics for Business and Economics, Vikas Publishing.

[3] H. L. Ahuja, Principles of Microeconomics, S. Chand (G/L) & Company Ltd, 2002.

[4] D. N. Dwivedi, Macroeconomics Theory and Policy, Tata McGraw-Hill Publishing Company, 2010.

[5] S Damodaran, Managerial Economics, Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course, students need to do assignment:

- Students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Electronics and Instrumentation Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
EIR4L2 ELECTRONIC WORKSHOP II	L	T	P	L	T	P	Total
	0	0	1	0	0	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To familiarize students with various Electronic devices and their specifications.
- Develop skill for Design and Testing of different types of Electronic subsystems using Analog and Digital IC's
- Familiarize students with PCB layout tool to prepare PCB print for assigned project.
- Develop skills of writing a structured technical document for project and its presentation.
- Develop ability to diagnose faults and their rectification.

COURSE CONTENTS

List of Exercises / Experiments

1. Familiarization /Identification of electronic components with specification and Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.
2. Drawing of electronic circuit diagrams using EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.
3. Familiarization/Application of testing instruments and commonly used tools like Multimeter, Function generator, Power supply, CRO etc. Soldering iron, De-soldering pump, Cutters, Wire strippers, Screw drivers, Hot air soldering and desoldering station etc.
4. Testing of electronic components Resistor, Capacitor, Diode, Transistor, UJT and JFET using multimeter and different IC's using IC tester.

5. Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]

6. Assembling electronic circuit/system on general purpose PCB, testing and show the functioning (Total two projects. **Any one from 1-13 and one from 14-18 project list**)

List of Projects

1. Fastest Finger First Indicator Project
2. Fire Alarm Circuit
3. Plant Watering Watching Indicator
4. Clap switch for operating electric equipment like fan, bulb
5. Mobile Battery Charger
6. 7 Segment Counter
7. Metal Detector
8. Electronic letter box
9. Traffic Light circuit
10. Light-Sensitive Fire Alarm

11. Infrared Motion-Sensing Relay Switch
12. LPG Leakage Detector
13. Motion Detector Using NE555 Timer
14. Design and implement a single stage voltage amplifier using BJT in common emitter configuration for a gain of 10 to amplify input voltage 10 mVp-p, 10-100 KHz. Also tabulate the results for different input range.
15. Design and implement a two stage R-C coupled amplifier using BJT in common emitter configuration for a gain of 100 to amplify input voltage 1mVp-p, 10-100 KHz. Also tabulate the results for different input range.
16. Design and implement LOW PASS, HIGH PASS filter using OP-AMP with cut off frequency 10 KHz and a bandpass filter with passband of 100 KHz.
17. Design and implement variable frequency and variable amplitude triangular waveform generator using OP-AMP. Tabulate the frequency range and amplitude range for the implemented circuit.
18. Design and implement variable frequency and variable amplitude square waveform generator using OP-AMP. Tabulate the frequency range and amplitude range for the implemented circuit.

Learning Outcomes:

Upon completing the course, students will be able to design, test and implement any Analog or Digital circuit by making use of the various tools and instruments available in the Electronics Workshop.

BOOKS RECOMMENDED:

[1] K. A. Navas, "*Electronics Lab Manual*", Volume I, PHI, 5th Edition, 2015, ISBN: 9788120351424

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication Engg.) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET553 Object Oriented Systems	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: To familiarize with the Object oriented concepts through Java programming.

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Introduction to Object Oriented Programming:

Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, ~~Identity and messages~~. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

Unit-II

Introduction to Java classes and objects:

Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

Unit-III

Inheritance and Polymorphism:

Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

Unit-IV

Exception Handling and Multithreading:

Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle.

Unit-V

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

BOOKS RECOMMENDED

- [1] Cay S.Horstmann, *Core JAVA Vol-1*, 8/E Pearson Education, 2008.
- [2] Herbert Schildt, *The complete Reference*, 5/E Tata McGraw Hill, 2002.
- [3] Scott W Amber, *The Object Primer*, 3/E Cambridge, 2005.
- [4] Timothy, Budd, *Object Oriented Programming*, 3/E Pearson Education, 2002.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, Oreilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics & Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5C1 OBJECT ORIENTED PROGRAMMING	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objective: To learn about object oriented concepts through Java programming.

Prerequisites: basics of computer programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming:

Object oriented concepts, Need for object oriented programming, Principles of object oriented programming- Abstraction, Encapsulation, Polymorphism, Inheritance; Procedural language vs OOPs, Salient features of Java, Development of Java programming, Access modifiers, Introduction to object model, concept of object initialization, simple Java program structure.

UNIT-II

Introduction to Java classes and objects

Java data types, data type conversions and type casting, operators and their precedence, Types of operators, conditional statements- if—else, switch case, ternary operator, Iteration statements- for loop, while expression, do-while, branching mechanism, introduction to classes-class members and member functions, constructors, constructor overloading, String handling, wrapper classes, Arrays and vectors.

UNIT-III

Inheritance and Polymorphism

Inheritance basics, Types of inheritance, merits and demerits, application of keyword Super, method overriding and overloading, Inhibiting inheritance of class using Final, Dynamic method dispatch, runtime polymorphism, abstract classes, Interfaces, implementing interfaces, Packages in Java, importing packages and classes into programs, user defined packages

UNIT-IV

Exception handling and Multi-threading

Introduction to exceptions, need for exceptions, exception handling techniques, exception types, Using try-catch, finally, throw and throws keywords, user defined exceptions, Multi-threading in Java, Thread class, the Main Thread, creation of new Threads, Thread states, Thread priority, Thread synchronization.

UNIT-V

Java I/O, Applets and Event Handling

Basic I/O classes, byte streams and character streams, class File, reading and writing Bytes, Applet basics, Applet architecture, Applet class and methods, Applet life cycle, Event handling in Java, Delegation event model, types and sources of Events, Event listeners.

Learning Outcomes:

Upon completing the course, Student would be able to:

- Understand the basic concepts of Java programming
- Familiarize with the declaration of classes, arrays, operations with arrays, process of inheritance.
- Learn the implementation of interfaces, importing packages, handling exceptions and creating applets.
- learn how to write, compile and get results of simple application programs in Java

BOOKS RECOMMENDED:

- [1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.
- [2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.
- [3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.
- [4] Cay S.Horstmann, Core Java, vol-1, 8/E, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5C2 DIGITAL COMMUNICATION	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The course contents are aimed to provide:

- (1) Knowledge of various digital encoding techniques.
- (2) Understanding of various baseband and bandpass transmission and reception techniques.
- (3) Acquaintance with source encoding and channel encoding techniques.
- (4) To know why digital communication systems are better than analog communication systems.

Prerequisites:

Knowledge of Fourier analysis and random variables.

COURSE CONTENTS

UNIT-I

Review of Fourier transforms, Energy Spectral Density, Power Spectral Density and their properties, sampling & its types, TDM, Digital hierarchy. Digital encoding techniques: PCM, quantization (uniform and non-uniform), quantization noise, DPCM, ADPCM, DM, ADM and their comparison, speech encoding techniques.

UNIT-II

Line coding techniques: Desirable characteristics of Line codes, NRZ and RZ forms of unipolar, polar & bipolar and bi-phase line codes and their waveforms, PSDs and comparison. Inter Symbol Interference, pulse shaping (Raised cosine spectrum, duo-binary signalling), Eye patterns. Baseband reception and probability of error, optimum filter, matched filter, correlation receivers.

UNIT-III

Band-pass modulation and demodulation techniques: BPSK, DPSK, QPSK, BFSK, M-ary PSK & FSK, MSK (their generation, detection, waveforms, PSDs, signal constellation diagrams, performance of these systems in the presence of noise), GMSK. Introduction to Spread Spectrum techniques.

UNIT-IV

Information theory: Concept of amount of information, entropy & its types, source encoding such as Shannon-Fano, Huffman Codes. Information rate, channel capacity (its calculation for Binary Symmetric channel, Binary Erasure Channel, noiseless channels and Gaussian channel), Shannon's theorem, bandwidth and S/N trade off.

UNIT-V

Channel encoding techniques: Linear Block codes (Systematic Linear Block codes, Parity check matrix, Syndrome testing), cyclic codes, Hamming codes, BCH codes, convolution codes, their encoding and decoding operation.

Learning Outcomes:

Upon Completing the Course, Student will able to learn:

- (1) Various processes and their types involved in digital communication system.
- (2) Application and selection of these processes with their types, according to requirement.

BOOKS RECOMMENDED:

- [1]. Lathi B. P., Modern Analog and Digital Communication Systems, 4th ed., Oxford Univ. Press, 2011.
- [2]. Haykin Simon Communication System, 4th ed., Wiley Publication, 2001.
- [3]. Schaum's Outline Series, Analog and Digital Communication, 2nd ed., TMH, 2006.
- [4]. Taub & Schilling, Principles of Communication System, 4th ed., TMH, 2013.
- [5]. Dr. Bernard Sklar, Digital Communication, 4th ed., Pearson education, 2001.
- [6]. Proakis & Salehi, Digital Communication, 2nd ed., McGraw Hill, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ETR5C3	3	1	2	3	1	1	5
EMF AND TRANSMISSION LINE							
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To analyze field potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.
- To understand principles of Transmission Lines

Prerequisites: Matrix and Vector Algebra

COURSE CONTENTS

Unit I

Vector Analysis: General Treatment on Cartesian, cylindrical, spherical and general curvilinear co-ordinate systems with reference to vectors, operation of Gradient, Divergence, Curl, Laplacian, Gauss's Divergence theorem, Stoke's theorem.

Unit II

Electrostatics: Review of electric field quantities and their definitions. Gauss's flux theorem, Poisson's equation and Laplace equation, **Uniqueness theorem**, Green's theorem, Coulomb's law, dipole moment. Electrostatic field in dielectric: polarization, electric flux density, boundary conditions, capacitor and capacitance, **electrostatic shielding**, energy stored in electric fields.

Unit III

Magnetic Fields and Electromagnetic Induction: Magnetic flux and flux density, static currents in conducting media, Ampere's circuital law, Biot-Savart law, boundary conditions between magnetic

media, magnetic force, magnetic potential, magnetic force and torque, Lorentz force on straight and long current carrying conductors in magnetic field, magnetic force between two long and parallel current carrying conductors, Magnetic dipole and dipole moment, energy stored in magnetic field. Faraday's law for induction (transformer and motion), inductor and inductance (self and mutual).

Unit IV

Maxwell's Equations & Electromagnetic Waves: Maxwell's equations, equation of continuity displacement current, Maxwell's equation in point and integral forms, time-varying potentials, wave equations, uniform plane waves in dielectrics and conductors, power loss in a plane conductor, energy storage, Sinusoidally time varying uniform plane wave in free space & conductors, Poynting's vector theorem.

Unit V

Transmission Lines : Introduction of transmission line, line equations, equivalent circuit, impedance, measurement of line impedance, input reflection coefficient, of transmission lines, secondary constants, line sections, SWR and power, Smith chart and its applications, some applications

Learning Outcomes:

Upon completing the Course Student will able:

To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields & Transmission Line so that an in depth understanding of antennas, electronic devices, Waveguides is possible.

BOOKS RECOMMENDED:

Engineering Electromagnetics, William H. Hayt; Mc-Graw Hill.

Theory and Problems of Electromagnetics, Joseph A. Edminister; McGraw Hill.

Element of electromagnetics Electromagnetic, Mathew N.O Sadiku, Oxford University Press.

Elements of Engineering Electromagnetics, N. Rao, Prentice Hall.

Electromagnetics for Engineers, Fawwaz T. Ulaby, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) V Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET504 Microcontroller	L	T	P		TH	CW	SW	PR	Total
	Duration of paper: 3 hrs	4	-	2	Max	100	50	50	50
				Min	35	25	25	25	110

Course Objectives: Fundamentals of microcontrollers, Study of 8051 microcontroller, interfacing of various peripherals to microcontroller, building to embedded system.

Prerequisite(s): Fundamental knowledge of Digital Electronics, Microprocessor hardware and Assembly Language Programming.

COURSE OF CONTENTS

Unit I

The 8051 architecture

~~Microprocessor and Microcontroller, Comparison of microprocessors and microcontrollers Microcontroller survey microcontrollers of different word length, make and features ,selection criteria for microcontroller ,8051 microcontroller hardware I/O pins and internal architecture internal RAM,ROM organization , I/O port circuits ,connecting external memory~~

Unit II

Assembly Language Programming

~~Addressing modes, data transfer, arithmetic, logical ,branch transfer ,stack and bit related instructions Programming 8051 for basic operations, connecting 8255 ,Programming tools and techniques~~

Unit III

Interrupts

~~Timer interrupt , serial port interrupt , external interrupt ,reset , interrupt control ,interrupt priority Interrupt destinations ,software generated interrupts, connecting A/D and D/A ,application programs using interrupt.~~

Unit IV

Counter and timers

~~Timer modes of operation ,timer counter interrupt ,counter ,serial data transmission ,reception, Serial data transmission modes , programming based on timer application and serial transmission.~~

Unit V

Interfacing and applications

Scanning programs for small keyboards ,interrupt driven programs ,program for matrix keyboard LCD display ,frequency measurement ,pulse measurement ,multiple interrupts, measurement and control of physical parameter as temperature ,stepper motor control

BOOKS RECOMMENDED

- [1] Mazidi Mazidi McKinley, *The 8051 Microcontroller & Embedded system Using Assembly and C*, 2/E Pearson Education, 2006
- [2] Kenneth J.Ayala, *The 8051 Microcontroller*, 3/E Penram International, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5E1 MICROCONTROLLERS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: In this student would learn the architecture of AVR, interfacing and controlling of peripheral devices through programming in assembly as well as in embedded C of AVR microcontroller. The course will cover AVR, 8-bit Microcontroller in detail with sufficient exposure to design an automated system.

Prerequisite: knowledge of Digital Logic Design, Microprocessor architecture, logical ability and programming skills.

COURSE CONTENTS

Unit 1: Introduction to Microcontroller

Microcontrollers and Embedded processors, Microcontroller survey, Overview of AVR family, AVR Microcontroller architecture, Register, status register, ROM space and other hardware modules, ATmega32 pin configuration & function of each pin.

Unit 2: AVR Assembly Language Programming

Addressing modes of AVR, Different instructions, assembly language programs, I/O Port Programming, Time delay loop, BCD, ASCII conversion Program, Look-up table, Bit addressability, Accessing EEPROM, MACROS.

Unit 3: AVR Programming in C and Timers

Data types, I/O programming, logic operations, Intel HEX file, Timer programming in assembly and C, Input capture and Wave Generator, PWM programming.

Unit 4: Interrupt & Serial Port Programming

Interrupt environment, Interrupt programming and applications, Serial Port programming and applications.

Unit 5: Peripheral Interfacing

LCD and Keyboard Interfacing, ADC, DAC and sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, DC motor control, SPI protocol and Display interfacing, I2C Protocol and RTC interfacing.

Learning Outcome:

After learning the course the students should be able to:

1. Understand the architecture of AVR 8-bit Microcontroller.
2. Describe the importance and function of each pin of AVR ATmega32 Microcontroller.
3. Write, debug and simulate assembly as well as embedded C language programs.
4. Understand Timer operation, Interrupt environment and Serial Communication.
5. Interface I/O peripheral devices with microcontroller.
6. Summarize the functionality of I2C and SPI protocol.

BOOKS RECOMMENDED:

- [1] The AVR Microcontroller and Embedded Systems Using Assembly and C, By Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi, Pearson Education.
- [2] Programming and Customizing the AVR Microcontroller, By Dhananjay Gadre, McGraw Hill Education
- [3] AVR ATmega32 data sheet

List of Practical Assignments:

1. BASIC PROGRAMS IN ASSEMBLY LANGUAGE :-

- I. Write a program to Toggle all bits of PORTB by sending value \$55 and \$AA continuously. Put delay between each issuing of data to PORTB.
- II. Write a program when an LED is connected to each pin of PORTD. Turn on each LED from pin D0 to D7.
- III. Write a program to create a square wave of 50% duty cycle on bit 0 to PORTC.
- IV. Write a program when a Switch is connected to pin PB2.
 - a) IF SW=0, send the letter 'N' to PORTD.
 - b) IF SW=1, send the letter 'Y' to PORTD.
- V. Write a program when a Switch is connected to pin PB0 and an LED to pin PB7. To get status of SW and send it to the LED.

2. AVR PROGRAMMING in C:-

- I. Write a program to toggle all bits of PORTB 200 times.
- II. Write a program to toggle all bit PORTB continuously with 100ms delay XTAL=8MHz.
- III. WAP to read pins 1 and 0 of PORTB, send ASCII code to PORTD as per following status of Pin1 Pin0.

Pin1	Pin0	
0	0	send '0' to port D
0	1	send '1' to port D
1	0	send '2' to Port D
1	1	send '3' to Port D

- IV. Write a program to send value 44H serially one bit at a time via PORTC pin3 (LSB FIRST).
- V. Write a program to store 'G' into location 0x005F of EEPROM.

3. CODE CONVERSION (IN ASSEMBLY AND C):-

- I. Write a program to perform checksum byte calculation for data.

- II. Write a program to calculate the checksum byte for given data.
- III. Write a program to convert hexadecimal number FDH to decimal and display digit on PORTB, PORTC, PORTD.
- IV. Write a program to convert Packed BCD to ASCII.
- V. Write a program to convert ASCII to packed BCD.
- 4. TIMER PROGRAMMING (IN ASSEMBLY AND C):-**
- I. Write a program to toggle all bits of PORTB using some delay. Use CTC mode. Assume XTAL=8MHz.
- II. Write a program using of prescaler 64 to generate delay of 1920 μ s. Assume XTAL=8MHz.
- III. Toggle only the PORTB.4, Use Timer1, normal mode, no prescaler to create the delay of 2ms.
- IV. Use TOV0 flag to extend Timer0 to a 16-bit counter and display on PORTC and PORTD.
- 5. INTERRUPT AND SERIAL PORT PROGRAMMING (IN ASSEMBLY AND C):-**
- I. Using Timer1, toggle pin PORTB.5 every second, while at the same time transfer data from PORTC to PORTD.
- II. Write a program to receive bytes of data serially and put on PORTB. Set baud rate =9600 & use 1 stop bit.
- III. Write a program to toggle PORTC.3, whenever INT0 goes low.
- IV. Write a program to transmit the letter 'G' serially at 9600baud, continuously. Do this task with interrupt and without Interrupt.
- 6. LCD, KEYBOARD AND OTHER PERIPHERAL INTERCACING AND PROGRAMMING (IN ASSEMBLY AND C)**
- I. Write "HELLO" on the LCD using port A of Atmega 32.
- II. Interface Keyboard with Atmega 32 and write a program to send ASCII code to Port D for any key pressed.
- III. Interface DAC 0808 with Atmega 32 and generate a triangular wave.
- IV. Interface LM 34 with Atmega 32 and write a program to read the sensor continuously and display the reading on Port D.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
3ET554 Digital Signal Processing	4	-	-	Max	100	50	-	-	150
				Min	35	25	-	-	60
Duration of paper: 3 hrs									

Objectives: To provide the analysis techniques for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Pre-requisites: Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

Unit-I

Introduction to signal processing , Discrete time signals and sequence operations ,properties . Discrete time systems ,their properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system ,Linear constant coefficient difference equations and their solutions ,MATLAB exercises

Unit-II

Frequency domain representation of discrete time signals and systems ,suddenly applied complex exponentials inputs , representation of sequences by Fourier transforms , conditions of their convergence ,symmetry properties of the FT, Fourier transform theorems, MATLAB exercises

Unit-III

Introduction to Z- transforms , ROC and their properties , Inverse Z – transform, Z-transform properties ,Initial value theorem ,structures for discrete time systems ,block diagram representation of linear constant coefficient difference equations , Direct form I ,II . signal flow graph representation of LCCDE, basic structures for IIR systems , direct forms,cascade,parallel forms ,transposed forms ,basic structures for FIR systems ,Direct form , cascade form structures for linear phase FIR systems, MATLAB exercises

Unit-IV

Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals ,sampling the FT, Fourier representation of finite duration sequences , the discrete Fourier transform ,properties of DFT ,symmetry properties ,~~circular convolution ,linear convolution using DFT, Implementing LTIV systems using DFT,~~ MATLAB exercises

Unit-V

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms. Filter design techniques ,design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing ,properties of commonly used windows, MATLAB exercises

BOOKS RECOMMENDED

- [1]Oppenheim and Schaffer, *Discrete time signal processin*, 2/E PHI, 2005.
- [2] Proakis and Manolakis, *Discrete time signal processing*, PHI, 2005.
- [3] S. Mitra, *Discrete time signal processing*, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR5G3 DIGITAL SIGNAL PROCESSING	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To provide the analysis techniques like for discrete time systems analyze the discrete time systems in time and frequency domain using Z- Transform and Fourier transforms to learn the signal processing tool box of MATLAB for implementing the basic problems of DSP designing of digital filters.

Prerequisite(s): Awareness about the analysis of analog signals and systems and analog filter design.

COURSE OF CONTENTS

Unit-I

Introduction to signal processing , Discrete time signals and sequence operations , Discrete time systems properties ,Linear time invariant systems ,convolution ,properties of LTIV systems ,Inverse system .Frequency domain representation of discrete time signals and systems(DTFT), properties,Representation of sequences by Fourier transforms.

Unit-II

Introduction to Z- transforms , properties , Inverse Z – transform, ,block diagram representation of linear constant coefficient difference equation,Signal flow graph representation of LCCDE, Basic structures for IIR systems ,Basic structures for FIR systems. Representation of periodic sequences , the discrete Fourier series ,properties of DFS, Fourier transform of periodic signals, properties,circular convolution ,linear convolution using DFT, Implementing LTIV systems using DFT.

Unit-III

Efficient computation of DFT , Goertzel algorithm , decimation in time FFT algorithm, In place computation, alternative forms , decimation in frequency FFT algorithm , In place computation, alternative forms.

Unit IV

Filter design techniques ,Design of discrete time IIR filters from continuous time filters, filter design by impulse invariance , bilinear transformation ,design of FIR filters by windowing properties of commonly used windows.

Unit V

Introduction of DSP Processor.Types of Digital signal processors , Applications.

Learning Outcome:

At the end of the course, students should be able to do the following:

- Analyze discrete-time systems in both time & transform domain and also through pole-zero placement.
- Analyze discrete-time signals and systems using DFT and FFT.
- Design and implement digital finite impulse response (FIR) filters.
- Design and implement digital infinite impulse response (IIR) filters.
- Understand and develop multirate digital signal processing systems.

BOOKS RECOMMENDED

[1] Oppenheim and Schaffer, Discrete time signal processing, 2/E PHI, 2005.

[2] Proakis and Manolakis, Discrete time signal processing, PHI, 2005.

[3] S. Mitra, Discrete time signal processing, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		III Year B.E. (Electronics & Telecommunication Engg.)
Subject Code & Name	Instructions Hours per Week	Credits

ETR5L3	L	T	P	L	T	P	Total
SOFTWARE WORKSHOP	-	-	2	-	-	2	2
Only Practical examination will be held							

Learning Objective: To familiarize students about Java based application programs

Prerequisites: Basics of Java programming

COURSE CONTENTS

UNIT-I

Introduction to Object Oriented Programming, Java based application programs related to topics such as conditional statements, iteration statements with a focus on problems related to electronics and telecommunication.

UNIT-II

Introduction to string handling, Arrays, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-III

Introduction to Inheritance and Polymorphism, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-IV

Exception handling and Multi-threading, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

UNIT-V

Java I/O, Applets and Event Handling, creating GUIs in AWT windows, Java based application programs related to these topics with a focus on problems related to electronics and telecommunication.

List of Practical Assignments:

1. Write a program that converts inches to centimeters.
2. Write a program in which the program gives output numbers 1 to 10 along with their square roots.
3. Write a program to find the average of five double numbers.
4. Write a program to determine the area of a sector of circle of radius r and angle subtended by the sector at the centre, a . The values of these variables are entered by the user.

5. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
6. Write a program in which a sample of 8 random numbers is generated and an average value is determined by the user.
7. *Make a program which uses a for loop to calculate and display squares and cubes of numbers from 1 to 8.*
8. Write a program that finds the greatest of 4 integer numbers using ternary operator. The number values are entered by the user of the program.
9. *Write a program in which a sample of 8 random numbers is generated and an average value is determined.*
10. Write a program in which a class is declared to deal with the characteristics of regular polygons and declare methods for determining area and perimeter. The length of the side and number of sides are declared public.
11. Write a program in which a method is declared to determine volume of a box with length, width and height as variables. The arguments should be passed on by reference.
12. Create a class Circle. Write a program to calculate:
 - (i) circumCircle() - to compute the circumference of a circle.
 - (ii) arcLength – to compute the length of the arc for a given angle.
13. Within the main method of the class Circle, create an object of the class Circle. Compute Circle's circumference when the radius is 10 and arc length when the angle is 45.
14. Write a program that declares an array of type double and finds out the square roots of the array elements.
15. *Write a program to demonstrate the multiplication of two matrices.*
16. *Write a program in which method overriding is implemented. The super class declares two instance variables i.e. radius and height, and define a method to determine the volume. The sub class determines the volume of cone and cylinder.*
17. *Make program to determine the trigonometric functions sin(), cos() and tan() by using methods of Math class for angles 30, 60, and 90 degrees.*
18. *Declare an interface with a method to calculate volume with one double parameter. Implement the same for finding volume of sphere and volume of a cube.*
19. *Make an applet program to display strings in different colors.*

Learning Outcomes:

Upon completing the course, Student would be able to:

- Write Java based application programs
- Learn to apply the concepts relating to various topics

BOOKS RECOMMENDED :

[1] Herbert Schildt, Java The complete reference, McGraw Hill Education private limited, 2013.

[2] Anita Seth, B.L.Juneja, Java One Step Ahead, Oxford University press, 2017.

[3] Timothy, Budd, Object Oriented Programming, 3/E Pearson Education, 2002.

[4] Cay S.Horstmann, Core Java, vol-1,8/E, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year(Electronic & Telecommunication) V Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS506 Principles of Management	L	T	P	TH	CW	SW	PR	Total	
	2	-	-	Max	-	50	-	-	50
Duration of paper: 3 hrs				Min	-	25	-	-	25

Course Objectives: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Principles & Functions of Management.

Prerequisite(s): - NIL

COURSE OF CONTENTS

Unit I

The Nature of Management:

Definition and role of management; the function of a manager, Scientific management. Various schools of management thought. The Functions & Principles of management.

Unit II

Planning:

Nature and purpose of planning, Components of planning objective of business.

Unit III

Organization:

Nature and purpose of organizing Structure, Centralization, Decentralization, Span of control, Delegation of authority relationship. Formal and informal organization.

Unit IV

Directions & Staffing:

Direction process, Theories of motivation and leadership, Need analysis, Communication.

Unit V

Control:

Meaning and process of control, techniques of control evaluation, developing and compensating the employees, Merit rating.

BOOKS RECOMMENDED:

- [1] Koontz and O'Donnel, Essentials of Management, 6/E TMH Jan, 1986
- [2] R.D Agrawal, *Organization & Management*. 1/E PHI, 1997
- [3] Peter Drucker, *Practice of Management*, 1992
- [4] Mc Farland, *Management, Principal and Practice*.
- [5] L.M Prasad, *Principal and Practice & Mgt*.
- [6] T.N Chhabra, *Principal and Practice & Mgt*, 1/E
- [7] G.R Terry, *Principal of Management's*.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Electronics & Telecommunication) Semester IV			
Subject Code & Name	Instructions Hours per Week			Credits			
STR5S5: Principles of Management	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide engineering students with an accelerated introduction to the basics of management and the language of business.
- To provide a basis of understanding to the students with reference to working of Business Organizations through the process of Management.
- To inculcate the managerial skills and to teach how it can be executed in a variety of circumstances.

COURSE CONTENTS

UNIT I –INTRODUCTION TO MANAGEMENT AND ORGANISATION

Basic concepts of management-definition, principles , levels and functions of management; Managerial roles and skills; Organization-meaning, types, **business environment, efficiency and effectiveness.**

UNIT II –PLANNING

Nature and purpose of planning -types of planning, planning process, **forecasting; Objectives-setting objectives, types of objectives; Decision making.**

UNITIII –ORGANISING AND STAFFING

Organization chart, Organization structures, departmentalization, span of control, delegation of authority-centralization and decentralization; Informal organization; process of Staffing.

UNIT IV –DIRECTING

Direction-meaning, process and components; motivation-theories of motivation; leadership-types and theories of leadership; **communication-process, barriers and types.**

UNIT V –CONTROLLING

Meaning and process of managerial control, techniques of control evaluation-budgetary and non-budgetary control techniques; **Use of computers and IT in management control.**

Learning Outcome:

At the end of the course, students should be able to do the following:

1. Identify the key management processes and the relevance of management in organizations.
2. Understand the key management skills required in organizations and how these might be applied.
3. Evaluate their own managerial skills and the ways in which these might be developed.

BOOKS RECOMMENDED:

- [1]. R.D Agrawal, Organization & Management.1/E PHI 1997.
- [2]. Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition, 2012.
- [3]. Dinkar Pagare, Principles of Management, Sultan Chand & Sons, 2000.
- [4]. G.K.Vijayaraghavan and M.Sivakumar, Principles of Management, Lakshmi Publications, 5th Edition, 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) V Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET502 Analog Communication Engineering Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
				Min	35	25	25	25	110

Course Objectives: The course contents are aimed to provide the basics of signals and linear time invariant systems used in communication systems in depth knowledge of different types of analog communication system, different modulation techniques used in these systems behavior of different modulation techniques in presence of noise.

Prerequisite(s): The basic knowledge of Probability Theory.

COURSE OF CONTENTS

Unit I

Signals and Systems: Types of Signals - ~~Deterministic & Random, Periodic & Non-Periodic, Analog & Discrete, Energy & Power Signals.~~ Classification of Systems, Fourier series, Fourier Transform & Its Properties, Convolution, Signal Transmission Through LTI Systems, Auto Correlation, Cross Correlation, Energy Power Spectral Density.

Probability, Random Variables & their Moments, their Significance, Gaussian & Rayleigh Probability Density Functions, their Means and Variances, Q-Function, Central Limit Theorem.

Unit II

Amplitude Modulation: Need of Modulation in a Communication System, Block Schematic of a Typical Communication System. AM Modulation System, Modulation Index, Generation (Squire Law & Switching Modulator) & Detection (Envelope & Squire Law Detector) of AM Wave, Side Bands & Power Contents in AM Wave, DSB-SC (Balanced, Ring Modulator & Synchronous Detector), SSB-SC, ~~Its~~ Methods of Generation & Detection, Vestigial Side Band Modulation, Comparison of Various AM Systems, Frequency Division Multiplexing, Group Delay & Phase Delay.

Unit III

Frequency Modulation: Relationships between Phase & Frequency Modulation, Narrowband FM, Wide Band FM & their Spectrum, Transmission Bandwidth of FM And PM Signals, Constant Bandwidth Characteristics of FM, Methods of Generation (Direct & Indirect) & Detection of FM (Discriminators: Balanced, Phase Shift And PLL Detector), Pre-Emphasis & De-Emphasis, Stereophonic FM Broadcasting

Unit IV

AM Transmitter Block Diagram, TRF Receiver & Its Limitations, Necessity of Heterodyning, Super Heterodyne Radio Receivers, IF Amplifiers & Selection Of Intermediate Frequency. FM Transmitters, FM Receivers, AGC, AVC, AFC, Dynamic Range Of Receivers.

Unit V

Sources Of Noise, Noise Figure and Noise Figure Of Amplifiers in Cascade, Noise Bandwidth, Effective Noise Temperature, and Quadrature Components of Noise, Rician Noise as Narrow Band Gaussian Noise. Performance of AM, FM in Presence of Low Noise Case (SNR).

Introduction to Digital Communication: Nyquist Sampling Theorem, Time division Multiplexing, PAM, PWM, PPM.

BOOKS RECOMMENDED

- [1] Proakis and Salehi, *Fundamentals of Communication Systems*, 1/E Pearson Education, 2005.
- [2] Lathi B.P., *Analog and Digital Communication systems*, 3/E Oxford Press, 2007.
- [3] Haykin Simon, *Communication Systems*, 4/E John Willey & Sons, 2006.
- [4] Carlson, *Communication Systems*, 5/E McGraw Hill, 2004.
- [5] Taub & Schilling, *Principles of communication systems*, 3/E McGraw Hill, 2000.
- [6] Singh R.P. & Saprè, *Communication systems Analog & Digital*, 2/E TMH, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) V Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET503 Analog Electronics Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
				Min	35	25	25	25	110

Course Objectives: Analysis of transistor using H parameter model and Hybrid π model, Feedback concept applied to Amplifiers and Oscillators and Regulators.

Prerequisite(s): Basics of Semiconductor Theory, KCL, KVL, Knowledge of basic Network Theorems as Nortons, Thevenins, Maximum Power transfer.

COURSE OF CONTENTS

Unit -I

Review of transistor theory, transistor at low frequencies ,two port device and hybrid model ,H-parameters, Emitter follower, comparison of transistor amplifier configurations , linear analysis of transistor circuits, Miller's theorem and its dual , cascading transistor amplifiers, simplified common emitter hybrid model, high input resistance transistor circuits ,biasing problems, Darlington pairs, Bootstrapping.

Unit -II

Transistor at high frequencies, Hybrid π model ,CE short circuit current gain , concept of f_T and f_{β} and its measurement , current gain with resistive load ,single stage CE transistor amplifier response ,gain band width product, emitter follower at high frequencies. Multi stage amplifiers ,classification of amplifiers ,distortions in amplifiers , frequency response of amplifier , Bode plots ,step response of an amplifier , square wave testing , band pass of cascaded stages ,low frequency response of an RC coupled stage , effect of an emitter bypass capacitor on low frequency response.

Unit -III

Feedback amplifiers , classification of amplifiers , concept of feedback ,general characteristics of negative feedback amplifiers , input impedance , output impedance , topologies, analysis of a feedback amplifier, types of coupling in amplifiers

Unit - IV

Stability and oscillators , effect of feedback on amplifier bandwidth , frequency response of feedback amplifiers, stability , power amplifiers, class A,B,C,AB , their efficiencies , compensation , sinusoidal oscillators , Barkhausen's criteria , Resonant circuit oscillators , Wein bridge , Hartley's, Clapp's , crystal oscillators, push pull amplifiers.

Unit -V

FET , JFET, pinch off , VI characteristics, MOSFET, small signal model , CS and CD amplifiers, biasing techniques ,PMOS, NMOS and CMOS ,application of FET , cascode amplifiers, regulated power supplies, series and shunt voltage regulators, monolithic regulators, switching regulators, regulators using IC's , current regulators and fold back

BOOKS RECOMMENDED

- [1] Millman and Halkias, *Integrated electronics*, 4/E TMH, 2004.
- [2] Robert Boylested, *Electronics devices and circuits*, 9/E PHI, 2007.
- [3] Malvino, *electronics principle*, 6/E PHI, 2007.
- [4] B.S.Sonde, *Introduction to System Design Using Integrated Circuits*, 2/E, New Age Publishers, 1992.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics & Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6C1 VLSI DESIGN	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Learning Objective: This course presents the fundamental of Digital CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisites: Knowledge of Digital Circuit and Basics of Semiconductors is required.

COURSE CONTENTS

Unit I

VLSI design flow, VLSI design style, introduction to the basic fabrication processes (wafer preparation, oxidation, diffusion, etching, metallization and lithography, etc.), Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor.

Unit II

Threshold voltage equation and energy band diagram of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances. Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter

Unit III

Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation. Limitations of CMOS in NANO scale circuit design.

Unit IV

CMOS logic, Complex Logic Circuits, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit using CMOS and analysis of various design parameters.

Unit V

Sequential MOS Logic circuits , SR Latched circuits, clocked latch and Flip Flop Circuits, CMOS D latch and Edge Triggered Flip Flop, Design of the Schmitt trigger circuit, Dynamic random access and Static random access memory cell design and analysis, Sense amplifier and row and column decoder circuit.

Learning Outcomes:

Upon completing the course, Student would be able to:

1. Understand the static and dynamic behavior of MOSFETs (Metal Oxide Semiconductor Field Effect Transistors) and the secondary effects of the MOS transistor model.
2. To be aware about the trends in semiconductor technology, and how it impacts scaling and its effect on device density, speed and power consumption.
3. To understand MOS transistor as a switch and its capacitance.
4. Student will be able to design digital systems using MOS circuits (Static and Switching characteristics of inverters)
5. Able to learn Layout, Stick diagrams, Fabrication steps.
6. Understand the concept behind ASIC (Application Specific Integrated Circuits) design and the different implementation approaches used in industry.

BOOKS RECOMMENDED :

- [1]. Sung-mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuit analysis and Design, Tata McGraw-Hill, 3/e.
- [2]. R. Jacob Baker, Harry W. Li and David E. Boyce, CMOS Circuit design, layout and Simulation, PHI, IEEE press, Series Edition,
- [3]. Yuan Taur and Tak H. Ning, Fundamentals of Modern VLSI Devices, Cambridge university Press, Special Edition, 1998
- [4]. Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, PHI, 2/e
- [5]. Jan M. Rabaey, Digital Integrated Circuit, PHI, 2/e

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6C2 MOBILE AND WIRELESS COMMUNICATION	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: The course contents are aimed to provide:

- Evolution of mobile communication system from 1G to 5G.
- Understanding of various transmission and reception techniques used in different mobile communication systems.
- To know the importance of communication channel in performance of mobile communication system.

Prerequisites: Knowledge of analog and digital communication systems.

COURSE CONTENTS

Unit – I

Introduction to Wireless Communication: Classification of different wireless communication networks, Transceiver techniques for Mobile wireless communication and their types - Modulation, Channel Coding, Speech Coding, Spread spectrum Modulation, Multiple Access Techniques, Duplexing.

Unit – II

Channel Characterization: Characterizing Mobile-Radio Propagation, Large-Scale Fading, Path loss models, Small-Scale Fading, Types of small scale fading, fading parameters – Coherence time, coherence BW, Delay spread, Doppler spread. Models for Fading channel- Rayleigh Fading and Rician distribution for fading channel, Fading mitigation techniques - Equalization Techniques, Diversity Techniques, RAKE Receiver, OFDM.

Unit – III

Introduction to Cellular Mobile System: A basic cellular system, Performance criteria, Concept of frequency reuse channels, C/I ratio, cell splitting, sectoring, types of non co-channel interference, co-channel interference: measurement & reduction factor, Frequency management, Channel Assignment, Handoffs, Dropped call rate.

Unit – IV

GSM: System architecture, Air interfaces, Multiple access, Channel organization and framing structure, Call set-up procedure, Protocols and signaling, Authentication and security.

CDMA: CDMA Evolution, CDMA IS-95 systems - its forward and reverse links, PN sequence related to IS-95, Power control, Trans receiver techniques used in CDMA, call processing steps, Hand-off process.

Unit – V

Advanced Mobile Networks: Wireless Networks GPRS, EDGE, 3G-UMTS, Wi-max, WLAN, their architecture and working. Overview of IP and Mobile IP, Introduction to 4G & 5G systems.

Learning Outcomes:

Upon Completing the Course, Student will able to learn

- (1) Various processes and their types involved in mobile communication system.
- (2) Current and future Mobile communication standards and techniques used in standards.

BOOKS RECOMMENDED:

- [1].S Misra, “Wireless Communications and Networks” 3G and Beyond, Second Edition, Mc Graw Hill, 2013.
- [2].A F Molisch, Wireless communication, Second Edition, Wiley Publication, 2014.
- [3].A Biswas, M Chaudhary, Wireless Communication, Theory and Applications, Cambridge University Press, First Edition, 2017.
- [4].T.S.Rappaport, “Wireless Communications: Principles and Practice, Second Edition, Pearson Education/Prentice Hall of India, Third Indian Reprint 2003.
- [5].W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET555 Control Systems	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	35	25	25	25	110

Objective: Is to provide fundamentals of control engineering & the concept of mathematical modeling of the physical system. The subject gives various classical analysis tools for design & stability the systems in time domain & frequency domain.

Prerequisites: Knowledge of Laplace transforms, Basics of Matlab & Simulink

COURSE OF CONTENTS

Unit I

Introduction to the Control System & Modeling

Block diagram, open loop & close loop system, Servomechanism, Feed forward & Feed back control, Digital Control, Multivariable Control System, Non-Linear Control System.

Modeling of Physical Systems, Linear Approximations of Physical Systems, The transfer function, Block Diagram algebra, Signal Flow graphs, Mason's Gain Formula, A.C. & D.C Servomotors, Synchronos, Pneumatic & Hydraulic devices for control, Analog computer simulation

Unit II

Time Domain Analysis & Stability

Effect of using feedback, Sensitivity of control systems, Test signals, Time response of prototype First & second order system, Performance specifications of the prototype I & II order system, Effects of additions of poles and zeros to open loop & close loop transfer functions, time response of higher order s, stems & concept of dominant pole, Steady-state error & error constants, Types of controllers & their control action, Stability : BIBO & Zero input, Absolute & relative, Routh Hurwitz criterion, The Root-locus concept, Guidelines for sketching Root-locus, Root contours, Root-locus of systems with Dead time, MATLAB based problems.

Unit III

Frequency Domain Analysis of Control System

Cocept of complex frequency, Performance specification in frequency domain, Co-relation between frequency domain & time domain, Principal of argument, Polar plots, Bode plots, Nicholas Charts, Stability Analysis in Frequency Domain, Nyquist Criteria, stability margins, Relative stability , Systems with dead time, MATLAB based problems.

Unit IV

Design of feedback control systems

Approaches to system design, Cascade compensation networks, Design of Compensators in Time & Frequency domain, MATLAB based problems.

Unit V

State Variable Techniques

State variable representation for an LTI system, Different Canonical forms, Co- relation between state models & Transfer function, Solution of State Equations, Concepts of controllability & observability, MATLAB based problems.

BOOKS RECOMMENDED

- [1] B.C. Kuo, *Automatic Control System*, seventh edition , 6/E(PHI), 2006.
- [2] Nagrath& Gopal, *Control System Engineering*, 5/E edition - (Newage Publishers), 2007.
- [3] M.Gopal, *Control Systems (Principles & Design)* - 5/E (TataMcGraw Hill), 2007.
- [4] Bishop & Dorf , *Modem Control System* - (Addison Welseley)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6C3 CONTROL SYSTEM	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To provide the fundamental knowledge of control system engineering and the concept of mathematical modeling of the physical system. The subject gives various classical analysis tools for design and stability of system in time and frequency domain.

Prerequisites: Knowledge of Laplace transforms, Z-transform, Basics of MATLAB & Simulink.

COURSE CONTENTS

UNIT-I: Introduction to the control system & Physical modeling

Basic component of control system (CS), open-loop CS (non-feedback system), close-loop CS (feedback CS), Types of feedback CS- linear and non-linear CS, time-invariant and time variant CS, single variable and multivariable control system.

Effect of feedback on-overall gain, stability, sensitivity, external disturbance or noise, Block diagram representation of CS, Block diagram reduction rules, Transfer function (TF), Poles-zero concept, Signal flow graph (SFG), Mason's gain formula.

Modeling of CS- electrical networks, mechanical systems-translational and rotational mechanical system, analogy concept- force to voltage (F-V) and force to current (F-I) analogy.

UNIT-II: Time domain analysis & Stability

Time response of continuous-data system, Standard test signals, Time response of prototype first and second order CS, Performance specifications of prototype I & II order systems, Steady-state errors and error constants (positional, velocity, acceleration), Effect of adding Poles and Zeroes to open-loop and close-loop transfer function (TF), Concept of Dominant poles of TF.

Types of controllers and their control action-proportional (P), integral (I), derivative (D), PID control, and derivative feedback control, MATLAB based problems.

Stability-Concept of stability, Necessary conditions for stability, Absolute and relative stability, Algebraic Criterion of stability- Routh Hurwitz Criterion. The Root locus concept, Guidelines for sketching Root-locus, Root contour.

UNIT-III: Stability and Frequency domain analysis of CS

Frequency domain analysis- Concept of complex frequency, performance specification of frequency domain, Co-relation between time & frequency domain, Polar plot, Bode plot, Stability analysis in frequency domain- Nyquist Criterion, Stability margins-Gain and Phase margin, MATLAB Based Problems.

UNIT-IV: Design of Feedback CS & State Space Analysis of CS

Approach to system design, Preliminary considerations classical design, Realization of basic Compensators-Lead, Lag, and Lag-lead compensator, Design of compensators in Time and Frequency domain.

Concept of State, State Variable, and State Model, State model representation of an LTI system, co-relation between State Model and TF, Solution of State Equations, Transfer Matrix, Concept of Controllability & Observability, MATLAB based problems.

UNIT-V Digital Control Systems

Block diagram representation of Digital Control System, Sampling process, Mathematical analysis of sampling process, Reconstruction of sampled signal, Pulse Transfer Function, Zero-order and first order hold circuit, Mapping of s-plane to z-plane.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Understand the concept of LTI control systems, Importance of feedback in CS and stability concept.
- Able to Design a Stable Control System
- Understand the difference between Linear and Digital Control Systems.

BOOKS RECOMMENDED:

- [1] B.C. Kuo, Automatic Control System, 7/E, PHI, 2006.
- [2] I. J. Nagrath and M. Gopal, Control Systems Engineering, 5/E, New Age International Publishers, 2007.
- [3] M. Gopal, Control Systems (Principles & Design), 5/E, Tata McGraw Hill, 2007.
- [4] Bishop & Dorf, *Modern Control System*, Addison Welseley.
- [5] Ogata, Discrete-Time Control System, 2/e, PHI, 1995.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) V Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET505 Linear Devices and application	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	35	25	-	-	60

Course Objectives: In-depth knowledge of Operational Amplifier including its circuit analysis, design and applications.

Prerequisite(s): Analysis using R- parameter model, Feed-back concept.

COURSE OF CONTENTS

Unit I

Operational amplifier

Introduction ,internal architecture diagram ,differential amplifier-balanced ,unbalanced, level shifter Power amplifier ,Feedback concept , ideal and practical op-amp characteristic ,common-mode-rejection Ratio, offset error voltages and currents

Unit II

Basic op-amp circuits

Designing---Inverting ,noninverting amplifier, adder , subtractor ,voltage follower, integrator differentiator,comparator, zero crossing detector ,Schmitt trigger ,Voltage-to-current, current-to-voltage converter instrumentation amplifier ,logarithmic amplifier,

Unit III

Oscillators and signal generator

Designing -Frequency stability of oscillator , hartley ,colpitt ,crystal , phase shift ,wein's bridge oscillator ,Pulse and square waveform generator ,triangular waveform generator ,sweep frequency generator

Unit IV

Active filters

Low pass, high pass, bandpass, band-reject, all pass filter, first order and higher order filters- Butterworth ,chybeshev filter,

Unit V

IC voltage regulators

LM 305 ,319 ,723 ,gyrator,NIC convertor

BOOKS RECOMMENDED

- [1] Gayakwad R.A, *OpAmps and Linear IC's*, 4/e, Pearson Education, 2006.
- [2] Aatre, *Network Theory and Filter Design*, PHI, 2000.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6E1 LINEAR INTEGRATED CIRCUITS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: In-depth knowledge of Operational Amplifier including its circuit analysis, design and application.

Prerequisite: Analysis using R-parameter and feedback concept.

COURSE CONTENTS

UNIT I

Operational Amplifier Fundamentals: Amplifier Fundamentals, The Operational Amplifier ,Basic Op Amp Configurations, Ideal and practical Op Amp Circuit Analysis and characteristics ,Positive and Negative Feedback , Feedback in Op Amp Circuits , **The Return Ratio and Blackman's Formula** , Op Amp Powering. Circuits with Resistive Feedback: Current-to-Voltage Converters, Voltage-to-Current Converters, Current Amplifiers, Difference Amplifiers, Instrumentation Amplifiers, **Instrumentation Applications, Transducer Bridge Amplifiers**. CMRR, offset error voltage and current.

UNIT II

Active filters I: The Transfer Function, First-Order Active Filters, Standard Second-Order Responses, **KRC Filters, Multiple-Feedback Filters, State-Variable and Biquad Filters, Sensitivity**. Active filters II: Filter Approximations, Cascade Design, Generalized Impedance Converters, Direct Design, The Switched Capacitor, **Switched-Capacitor Filters, and Universal SC Filters**

UNIT III

Static Op Amp Limitation: Simplified Op Amp Circuit Diagrams, Input Bias and Offset Currents, Low-Input-Bias-Current Op Amps, Input Offset Voltage, Low-Input-Offset-Voltage Op Amps, Input Offset Error and Compensation Techniques, Input Voltage Range/Output Voltage Swing, Maximum Ratings. Dynamic Op Amp limitation: Open-Loop Frequency Response, Closed-Loop Frequency Response, Input and Output Impedances, **Transient Response, Effect of Finite GBP on Integrator Circuits, Effect of Finite GBP on Filters**, Current-Feedback Amplifiers.

UNIT IV

Stability: The Stability Problem, Phase and Gain Margin Measurements, Frequency Compensation of Op Amps, Op Amps Circuits with a Feedback Pole, Input-Lag and Feedback-Lead Compensation, Stability in CFA Circuits.

UNIT V

Designing- Adder, Subtractor, Integrator, Differentiator, Voltage follower, Comparator, Zero Crossing detector, Schmitt trigger, Peak Detector. Signal Generator: Sin wave generator, multivibrators, triangular and saw tooth wave generator, Log/Antilog amplifiers.

Learning Outcome:

After learning the course the students should be able to:

- Understand op-amp's basic construction, characteristics, parameter limitations, various configurations and other applications of op-amp.
- Analyze and design basic op-amp circuits, particularly various linear and non-linear circuits, active filters, signal generators, and data converters

BOOKS RECOMMENDED:

- [1] Millman & Halkias - Integrated Electronics, Tata McGraw Hill.
- [2] Franco-Design with Operational Amplifiers & Analog Integrated Circuits, TMH
- [3] Schilling & Belove-Electronic Circuit, Discrete & Integrated , TMH
- [4] Gayakwad R.A- Op-Amps and Linear IC's, Pearson .
- [5] Coughlin and Driscoll – Operational Amplifier and Linear Integrated Circuits – Pearson Education Asia.

List of Practical Assignments:

- 1) To measure the gain of inverting & non-inverting amplifier.
 - 2) To analyze the voltage transfer characteristics of op-amp.
 - 3) To study the inverting adder & subtractor configuration of op-amp.
 - 4) To study the non- inverting adder & subtractor configuration of op-amp.
 - 5) To study the differentiator configuration of op-amp.
 - 6) To study the integrator configuration of op-amp.
 - 7) To study the low pass & high pass filter.
 - 8) To study the band pass & band reject filter.
 - 9) To study the zero crossing detector.
- To analyze the performance of comparator.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) V Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
3ET501 Computer Networks	4	-	2	Max	100	50	50	50	250
				Min	35	25	25	25	110
Duration of paper: 3 hrs									

Objectives: The content covers the different types of computer networks, the layered approach of protocol stack, its advantage, and protocols of each layer.

Pre-requisites: Fundamental knowledge of data transmission.

COURSE OF CONTENTS

Unit I

Computer network – Hardware, Software, Reference model, physical layer

Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast, broadcast, Network Topology – Mesh, Star, Tree, Bus, Ring, Hybrid
Physical Layer – Shannons maximum data rate of a channel, Transmission media – Guided as Magnetic, Twisted Pair, coaxial cable, fiber optics etc., wireless as radiowave, microwave, infrared

Unit II

Data Link Layer

Framing techniques, Error detection-correction, Multiplexing-TDM, FDM, WDM; switching – circuit, message, packet switching, Repeaters, Hubs, Bridges, switches, routers and gateways; Data link protocols-- unrestricted simplex protocol, stop & wait, sliding window, Go-back- n, selective repeat, data link layer in internet

Unit III

Medium Access control sublayer

Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol Ethernet- frame format, cabling, encoding, performance, fast Ethernet, gigabit Ethernet, Broadband and wireless LAN, bluetooth

Unit IV

Network layer

Connectionless – connection oriented service, comparison of virtual circuit and datagram subnet, Routing algorithms- shortest path, flooding, distance vector, hierarchical routing, congestion control and prevention, Quality of service, network layer in internet- IP protocol and IP address, IPv6, OSPF, BGP routing protocol

Unit V

Transport layer and application layer

Elements of transport protocol, internet transport protocol-UDP / TCP protocol, performance issues- Network performance measurement, system design for better performance
Domain name system, email, world wide web- architecture, HTTP

BOOKS RECOMMENDED

- [1] Andrew S. Tannenbaum, *Computer Networks*, 4/E Pearson Education, 2003,
- [2] William Stallings, *Data and Computer Communications*, 8/E Prentice Hall India, 2007
- [3] Behrouz A. Forouzan, *Data Communications and Networking*, 4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6G4 COMPUTER NETWORKS	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives: The content covers the different types of computer networks, the layered approach of protocol stack, its advantage, and protocols of each layer.

Prerequisite(s): Fundamental knowledge of data transmission

COURSE OF CONTENTS

Unit I

Computer network – Hardware, Software, Reference model, physical layer

Network and application, categories of network-LAN, MAN, WAN, Wireless Network, Internetwork, Reference models.– OSI,TCP/IP model and their comparison, Line configuration-point to point, multicast ,broadcast ,Network Topology – Mesh , Star ,Tree , Bus , Ring , Hybrid
Physical Layer – Shannon’s maximum data rate of a channel, Transmission media – Guided as Magnetic, Twisted Pair, coaxial cable, fiber optics etc., wireless as radio wave, microwave, infrared

Unit II

Data Link Layer

Framing techniques , Error detection-correction , Multiplexing-TDM ,FDM,WDM ; switching – circuit , message , packet switching , Repeaters, Hubs , Bridges ,switches ,routers and gateways ;Data link protocols-- unrestricted simplex protocol, stop & wait , sliding window ,Go-back- n ,selective repeat, data link layer in internet

Unit III

Medium Access control sublayer

Channel allocation, Multiple access protocols – ALOHA, CSMA, CSMA /CD, collision-free protocol Ethernet- frame format, cabling, encoding, performance, fast Ethernet, gigabit Ethernet, Broadband and wireless LAN, Bluetooth

Unit IV

Network layer

Connectionless – connection oriented service, comparison of virtual circuit and datagram subnet, Routing algorithms- shortest path , flooding ,distance vector , hierarchical routing , congestion control and prevention ,Quality of service , network layer in internet- IP protocol and IP address,IPv6, OSPF, BGP routing protocol

Unit V

Transport layer and Application layer

Elements of transport protocol, internet transport protocol-UDP / TCP protocol, performance issues- Network performance measurement, system design for better performance
Domain name system, email, world wide web- architecture, HTTP

Learning Outcome:

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.
7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

BOOKS RECOMMEDED

- [1] Andrew S. Tannenbaum, Computer Networks, 4/E Pearson Education, 2003 ,
- [2] William Stallings ,Data and Computer Communications , 8/E Prentice Hall India, 2007
- [3] Behrouz A.Forouzan , Data Communications and Networking ,4/E Tata McGraw-Hill, 2000

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET556 Design Workshop	L	T	P		Th	Cw	Sw	Pr	Total
	-	-	2	Max	-	-	50	50	100
Duration of Theory Paper: Only Internal Test				Min	-	-	25	25	50

Course Objective: To introduce the Design and Realization of Electronics systems to solve engineering problems; good engineering Design practice; tools and materials relevant to electronics and electrical engineering. To provide initial training in Design skills required by Professional Engineers.

Prerequisites: Understandability of methods for A/D and D/A conversion, including concepts of resolution and accuracy necessary for conversion. Knowledge of Power requirements and efficiency, Power conversion and consumption and power demands of ICs, Supply decoupling. Estimation of power consumption in system from data sheets. Design of simple power supplies.

CONTENT OF COURSE

Unit-I Review

Review of DC Circuits, Active Circuits, ~~Diodes, Bipolar Junction Transistors, Field Effect transistors, Capacitance & Inductance (including transformers)~~, 1st & 2nd order Circuits (overview) Laplace Transforms (overview), s-Domain Circuit Analysis

Unit-II Power supplies and components

Sources of power. ~~Ideal and practical supplies: regulation. Batteries: primary and secondary, types, capacity and life. AC power supplies: rectification, simple, half wave and full wave; need for filter (capacitor) to reduce ripple. Zener diode regulator. Linear regulator circuits; dropout. Power dissipation: heat sinks, thermal resistance, calculation of heat sink required. Switching supplies: principle of operation, configurations. Passive components: specification, construction. Printed circuit boards (PCBs); effect of non-ideal PCB tracks; good grounding practice. Pin-through-hole (PTH) and surface mount (SMD) devices.~~

Unit-III Analog to digital and digital to analog conversion

Relation between analog and digital data: precision, resolution, range and accuracy. ~~Types of classical analog to digital converters (ADC): successive approximation, pipeline. Reference sources. Signal conditioning, sample-and-hold circuit. Sampling rate, Nyquist criterion, aliasing and need for anti-aliasing filter, over sampling. Sigma-delta converters, principle of operation, effect of over sampling ratio.~~

Unit-IV Electronic Computer Aided Design

Computer-aided design for ~~electronic circuits, graphical schematic capture, drawing standards for electronic systems, simulation using EDA software available, generation of part lists, printed circuit board layout and production.~~

Unit-V Electronics Design Project

System Design project: assembly, test and rework of printed circuit board; Design of Engineering system including analogue, digital and hybrid electronics and real-time software; use of test instruments including generated test patterns; software; integration of hardware and software.

Books Recommended:

- [1] P Horowitz and W Hill, *The Art of Electronics*, 2/e Cambridge, 1989
- [2] A S Sedra and K C Smith, *Microelectronic Circuits*, 5/e Oxford, 2004
- [3] B Baker A Baker's Dozen, *Real Analog Solutions for Digital Designers*, Newnes, 2005
- [4] W Jung, *Op Amp Applications Handbook*, Newnes, 2005
- [5] W Kester, *Mixed-signal and DSP Design Techniques*, Newnes, 2003
- [6] W Kester, *Data Conversion Handbook*, Newnes, 2004
- [7] R Mancini, *Op Amps for Everyone*, Newnes, 2003
- [8] S J Sangwine *Electronic Components and Technology*, StanleyThornes, 1998

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Electronics & Telecommunication Engg.)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR6L4 DESIGN WORKSHOP	L	T	P	L	T	P	Total
	-	-	2	-	-	2	2
Only Practical examination will be held							

Learning Objective: To enable student to design and Simulate circuit on Circuit simulation software and generate PCB layout. Fabrication of PCB for the generated circuit.

Prerequisites: Basic and Digital Electronics

COURSE CONTENTS

Perform any three Problems for Module 1 and 2 each. Design and Simulate on Circuit simulation software and generate PCB layout. Fabricate PCB for the generated circuit by obtaining bill of material.

MODULE 1 - DIGITAL ELECTRONICS

Q.1 Design a 3 bit counter which counts in the sequence

: 001, 011, 010, 110, 111, 101, 001, ...

(a) Use clocked D flip-flops

(b) Use J-K flip-flop

Q.2 Design and Implement a 8-bit barrel shifter using 4 X 1 Multiplexers.

Q.3 Design a one-input, one-output serial 2's complementer. The circuit accepts a string of bits from the input and generates the 2's complement at the output. The circuit can be reset asynchronously to start and end the operation.

Q.4 Design a four-bit shift register with parallel load using D flip-flops. There are two control inputs: shift and load. When shift = 1, the content of the register is shifted by one position. New data are transferred into the register when load = 1 and shift= 0. If both control inputs are equal to 0, the content of the register does not change.

Q.5 Design a 16-bit Magnitude comparator using IC 7485 (4-bit Magnitude comparator).

Q.6 Design a hardware stack to hold a maximum of four values, each consisting of one bit. The stack has the following input lines:

- Clock
- POP
- PUSH
- input data

and a single output line. The output line always reports the current top of the stack.

(Recall that a stack pushes data onto the top of the stack, and pops data from the top of the stack. In other words, last in, first out. If more than four values are pushed on, older values are discarded.)

You may use AND, OR, XOR, and NOT gates, etc; flip-flops of any kind; and/or decoders, multiplexers, etc.

MODULE 2 - ANALOG ELECTRONICS

Q.1 Design a common-emitter amplifier with output impedance $10K\Omega$ and a gain of 100 using a transistor of $\beta=200$ and a 24V power supply.

Q.2 Design a two stage RC coupled BJT amplifier to meet the following specifications.

$A_v \geq 5000$, $S_{iCO} \leq 10$, $F_l = 20\text{Hz}$, $V_o = 2V_o$, $V_{CC} = 15V$.

Calculate A_v , R_i and R_o of designed circuit.

Q.3 Design a cascode amplifier stage using bipolar transistors to drive a load resistor of $100\ \Omega$. The amplifier output is to be time varying signal of $\pm 600\text{mV}$. The overall performance of the amplifier is specified as:

- Operating current for cascode stage collectors = 1.2mA
- Overall gain = -30
- DC power supply $+15\text{V}$

Q. 4 Design the basic BJT differential amplifier to provide a differential input resistance of at and a differential voltage gain of $100\ \text{V/V}$. The transistor β is specified to be at least 100. The available positive power supply is 5V .

Q.5 Design a CMOS cascode amplifier with the following specifications:

DC gain = 2500

Gain-Bandwidth product = 100MHz .

Load capacitance = $1\ \text{pF}$

Q.6 Design a saw tooth generator using a 555 timer having a pulse duration of 10 sec and peak voltage of 5V .

Learning Outcomes:

Upon completing the course, Student would be able to:

- Design basic Analog and Digital circuit, PCB layout and use of EDA tool.

BOOKS RECOMMENDED:

[1].Bob Dobkin ,”Analog Circuit Design: A Tutorial Guide to Applications and Solutions”, Newnes Publications,2011.

[2]. Nihal Kulratna,”Electronic Circuit Design: From Concept to Implementation”,CRC Press,2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year(Electronic & Telecommunication) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS557	L	T	P		TH	CW	SW	PR	Total
Entrepreneurship Development & IPR	2	-	-	Max	-	50	-	-	50
Duration of paper: 3 hrs				Min	-	25	-	-	25

Objectives: To impart the basics of Entrepreneurship development Concepts. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur. To impart the basics of Intellectual property Rights.

Prerequisites: NIL

COURSE OF CONTENTS

UNIT I

Introduction:

Definition of Entrepreneurship and role of an entrepreneur. Entrepreneurial characteristics, values and attitudes. Entrepreneurship development programmes.

UNIT II

Modes & Methodology of setting up a Small Scale Industry:

Project Identification, Market Survey, Location & Building, Technical Know - How, Raw material & other Utilities, Professional & Skilled Manpower, Project Report, Finance, Whom to Approach.

UNIT III

Institutional Support to Entrepreneurs:

Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions. ~~Registration of a small scale Industry.~~

UNIT IV

Intellectual Property Rights:

Introduction of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators, ~~Sharing of Knowledge, Trade Marks etc.~~ General Provisions & Basic principles of IPR.

UNIT V

Patents:

Definitions, ~~Need for a patents, what can be patented,~~ Patent laws, Rights of Patent Holders, Filing of a Patent, Industrial Scenario.

BOOKS RECOMMENDED:

- [1] Colombo plan staff college for Technician Education, Manila , *Entrepreneurship Development*, Tata McGrawHill 1998
- [2] N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE III Year (Electronics & Telecommunication) Semester VI				
Subject Code & Name	Instructions Hours per Week			Credits			
STR6S6: Entrepreneurship Development & IPR	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide awareness about entrepreneurship.
- To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
- To self motivate the students by making aware of different opportunities and successful growth stories.
- To impart the basics of Intellectual property Rights.

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship-Concept, Nature, Functions and Importance; Entrepreneurs-Characteristics, Types and Motivation; Entrepreneurial process; Enterprise-Definition and Classification (MSME-Micro, Small & Medium Enterprises). Case Study: Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model. Class Activity: Idea generation by students.

UNIT III

Business Plan for New Ventures in Respective Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan. Class Activity: Students asked to finalize on their ideas and start writing business plans.

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs, DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks.

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1].Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2].Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications, New Delhi, 2011.
- [3].N.K. Acharya, Text book on intellectual Property Rights, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India				III Year BE					
Institute of Engineering & Technology				Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET558	L	T	P		TH	CW	SW	PR	Total
Operating Systems	4	0	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	35	25	-	-	60

Objective: To provide an introduction to Operating System concepts and its design issues.

Prerequisite: Computer Organization.

COURSE OF CONTENTS

Unit I Introduction

Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

Unit II Process Management

Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

Unit III Process Synchronization and Deadlock

Process Co-operation, Concepts of Interprocess communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

Unit IV Memory Management

Swapping, Segmentation, Paging and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

Unit V I/O management and other issues

Kernel, I/O hardware, I/O interfacing, I/O requesting and interrupts. Disk management: Disk Structure and Scheduling. Protection and Security. ~~Linux: Kernel Organization, Process and resource management, Memory management, Introduction to Linux File System. Overview of Windows Operating System design.~~

References:

- [1]. Silberschatz, Galvin and Gagne, *Operating System Principles*, 7th Ed. Addison Wesley.
- [2]. Gary Nutt, *Operating Systems*, 3rd Ed. Pearson Education, India
- [3]. Tanenbaum, *Modern Operating Systems*, PHI.
- [4]. W. Stalling, *Operating Systems*, Macmillan.
- [5]. H. M. Dietel , *Operating Systems*, Addison Wesley Longman.
- [6]. Maurice J. Bach, *The design of Unix Operating system*, Pearson Education, India.
- [7]. Sumitabha Das, *Unix Concepts & Applications: includes SCO Unix & Linux*, Tata McGraw Hill

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Electronic & Telecommunication) VI Sem					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET552 Telecom Networks	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	35	25	25	25	110

Course Objectives: To give the knowledge about different types of communication networks like PSTN, ISDN, BISDN, their basic structure, applications, communication protocols, switching techniques etc.
To give the concepts of traffic engineering to analyse the communication networks.

Prerequisite(s): Basic knowledge of data communication, layered architecture of communication networks, basics of stochastic process.

COURSE OF CONTENTS

Unit 1 ~~Evolution of Telecommunication, telecommunications standards, introduction to OSI Model, various communication networks, basics of digital communication and transmission, introduction to sampling and pulse code modulation, speed digitization, concept of time division multiplexing, multiplexing hierarchy (T and E carriers), SONET/SDH, Overview of line coding and subscriber line technology.~~

Unit 2 ~~Switching systems- basics of switching systems, manual switching system, strowger switching system, crossbar switching system, space division switching and time division switching. Types of switching, circuit switching, packet switching.~~

Unit 3 ~~Telephone Networks (PSTN)- subscriber end instruments, subscriber loop systems, transmission system, signaling system, trunk networks. Telecommunication Traffic- unit of traffic, network traffic load and parameters, grade of service and blocking probability, modeling switching system, Markov processes, incoming traffic and service time characterization, blocking models and loss estimates.~~

Unit 4 ~~Introduction to wireless networks different types of wireless networks (WAN, WMAN, WLAN) Introduction to mobile radio communication cellular network organization, frequency reuse concepts, operation of cellular system, hand off. Introduction to IEEE WLAN, types, protocol architecture, applications. Introduction to Wi MAX and its applications.~~

Unit 5 ~~Integrated Services Digital Networks- evolution, basic principles, architecture and reference points, various frame formats, protocol stack, ISDN services. Broadband ISDN- architecture, protocol stack, cell format, BISDN services.~~

BOOKS RECOMMENDED:

- [1] Thiagrajan Viswanathan, *Telecommunications Switching Systems and Networks*, PHI, 1998.
- [2] J.E. Flood, *Telecommunications Switching Traffic and Networks*, Pearson Education, 2004.
- [3] W. Stallings, *Wireless Communication and Networks*, Pearson Education Asia, 2001.
- [4] W. Stallings, *ISDN and Broad band ISDN with Frame Relay and ATM*, Pearson Education, 2005.
- [5] Lathi B.P., *Analog And Digital Communication systems*, Oxford Press, 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronic & Telecommunication)				
Subject Code & Name		Instructions Hours per Week			Credits			
ETR7C2 OPERATING SYSTEM		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Learning Objectives:

The course contents are aimed to provide:

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management

Prerequisites: Basic knowledge of Data Structures and Computer Organization.

COURSE CONTENTS

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls, System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non-preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

UNIT-IV

Memory Management and File system: Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

Upon Completing the Course, Student will able to learn:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.

- They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

- [1]. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley.
- [2]. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India
- [3]. Tanenbaum, Modern Operating Systems, PHI.
- [4]. W. Stalling, Operating Systems, Macmillan.
- [5]. H. M. Dietel, Operating Systems, Addison Wesley Longman.
- [6]. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
- [7]. Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours p week			Marks	TH	CW	SW	Pr	Total
	L	T	P						
4ET504 Antenna & Wave Propagation				Max	100	50	50	50	250
Duration of Theory Paper: hrs	4	-	2	Min	35	25	25	25	110

Course objective: The objective of this course is to give students the knowledge and understanding of the basic concepts of antenna and radio wave propagation. It gives emphasis to the antenna theories, modeling, analysis and design and also the physical behaviors along with the radio wave propagation problems in telecommunication field.

Prerequisite: Knowledge of Electromagnetic field and theory, Fundamentals of Physics

COURSE OF CONTENTS

Unit I

Introduction to types of antennas, radiation mechanism, current distribution on thin wire antenna, radiation pattern like isotropic, directional and omnidirectional, Radiation intensity, gain, directive gain, directivity, antenna efficiency, effective area, effective length, reciprocity theorem, radar equation, beam efficiency, bandwidth, polarization Antenna temperatures, FBR, radiation resistance, Equivalent noise temperature of antenna.

Unit II

Poynting theorem, wave equation in terms of electromagnetic potentials and their solution, short electric dipole, retarded vector potential, small current element, small dipole, Finite length dipole, Half wavelength dipole, Infinite perfect conductors, ground effects.

Unit III

Introduction to various form of array, array of n isotropic sources of equal and unequal amplitude and uniform spacing, design consideration of Broadside, Endfire, Dolph Tchebyscheff arrays, continuous arrays, rectangular arrays, planar array, binomial array circular array, and superdirectivity.

Unit IV

Hertz and Marconi antenna, ground and antenna losses, High frequency antenna, Dipole antenna, Harmonic antenna and inverted V antenna, Rhombic Antenna, RDF, Loop antenna, Adcock Antennas & direction finder, Folded Antenna, Yagi Uda Antenna, Corner Reflected Antenna, Helical Antenna, Horn Antenna, Slot Antenna, Microstrip Antenna, LPDA, Microwave Antenna, Antenna with parabolic reflector, Lens Antenna, Antenna Measurements.

Unit V

Modes of propagation, Sky wave propagation, Effect of earth's magnetic field on Ionospheric radio wave propagation, Virtual heights, MUF, LUF, Skip distance, OMF, Ionospheric abnormalities, Multi-hop propagation, Duct propagation, VLF and ELF propagations.

References:

- [1].K.D.Prasad, *Antenna and Wave Propagation*, 3/e, reprint-2007, Satya Prakashan, New Delhi.
- [2]Constantine A.Balanis, *Antenna Theory: Analysis and Design*, 2/e, John Wiley & Sons Inc, Noida India
- [3].John Daniel Kraus, Ronald J. Marhefka, *Antennas*, 3/e, McGraw-Hill Higher Education
- [4].C.G.Christodoulou, P.F.Wahid, *Fundamentals of Antennas: Concepts and Applications*, SPIE
- [5].S.R.Saunders, *Antennas and Propagation for Wireless Communication Systems*, 1/e, Wiley, John & Sons, Inc.
- [6].Richard C. Johnson, Henry Jasik, *Antenna Engineering Handbook*, McGraw-Hill Companies

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7C3 ANTENNA AND WAVE PROPOGATION	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: This course presents the fundamental concepts of antenna and radio wave propagation. It gives emphasis to the antenna theories, modeling, analysis and design and also the physical behaviors along with the radio wave propagation problems in telecommunication field.

Prerequisites: Knowledge of Electromagnetic field and theory, Fundamentals of Physics

COURSE CONTENTS

UNIT-I

Introduction to types of antennas, radiation mechanism, current distribution on thin wire antenna, radiation pattern like isotropic, directional and omnidirectional, Radiation intensity, gain, directive gain, directivity, antenna efficiency, effective area, effective length, reciprocity theorem, radar equation, beam efficiency, bandwidth, polarization Antenna temperatures, FBR, radiation resistance, Equivalent noise temperature of antenna.

UNIT-II

Poynting theorem, wave equation in terms of electromagnetic potentials and their solution, short electric dipole, retarded vector potential, small current element, small dipole, Finite length dipole, Half wavelength dipole, Infinite perfect conductors, ground effects.

UNIT-III

Introduction to various form of array, array of n isotropic sources of equal and unequal amplitude and uniform spacing, design consideration of Broadside, End fire, Dolphy Tchebyscheff arrays, continuous arrays, rectangular arrays, planar array, binomial array circular array, and super directivity.

UNIT-IV

Huygens' Principle, Hertz and Marconi antenna, ground and antenna losses, High frequency antenna, Dipole antenna, Harmonic antenna and inverted V antenna, Rhombic Antenna, RDF, Loop antenna, Adcock Antennas & direction finder, Folded Antenna, Yagi Uda Antenna, Corner Reflected Antenna, Helical Antenna, Horn Antenna, Slot Antenna, Microstrip Antenna, LPDA, Microwave Antenna, Antenna with parabolic reflector, Lens Antenna, **Babinet's Principle**, Antenna Measurements.

UNIT-V

Modes of propagation, Sky wave propagation, Effect of earth's magnetic field on Ionospheric radio effective length wave propagation, Virtual heights, MUF, LUF, Skip distance, OWF, Ionospheric abnormalities, Multihop propagation, Duct propagation, VLF and ELF propagations.

Learning Outcomes:

Upon completing the course, student will able to grasp the fundamental concept of antenna and its radiation mechanism.

BOOKS RECOMMENDED:

- [1]. K.D.Prasad, Antenna and Wave Propagation, 3/e, Satya Prakashan, New Delhi; reprint-2007.
- [2]. Constantine A.Balanis, Antenna Theory: Analysis and Design, 2/e, John Wiley & Sons Inc, Noida India.
- [3]. John Daniel Kraus, Ronald J. Marhefka, Antennas, 3/e, McGraw-Hill Higher Education
- [4]. C.G.Christodoulou, P.F.Wahid, Fundamentals of Antennas: Concepts and Applications, SPIE
- [5]. S.R.Saunders, Antennas and Propagation for Wireless Communication Systems, 1/e, Wiley, John & Sons, Inc.
- [6]. Richard C. Johnson, Henry Jasik, Antenna Engineering Handbook, McGraw-Hill Companies.

List of Practical Assignments:

- 1) ARRANGING THE TRAINER AND PERFORMING FUNCTIONAL CHECKS
- 2) STUDY OF SIMPLE DIPOLE $\lambda/2$ ANTENNA.
- 3) TO PERFORM POLARISATION TEST.
- 4) TO PERFORM MODULATION TEST.
- 5) STUDY OF THE VARIATION IN THE RADIATION STRENGTH AT A GIVEN DISTANCE FROM THE ANTENNA.
- 6) STUDY OF RECIPROCITY THEOREM.
- 7) TO PRACTICE HOW TO USE THE MATCHING STUB PROVIDED WITH THIS TRAINER.
- 8) SWR MEASUREMENT.
- 9) STUDY OF SIMPLE DIPOLE $\lambda/4$ ANTENNA.
- 10) TO STUDY FOLDED DIPOLE $\lambda/2$ ANTENNA.
- 11) STUDY OF YAGI UDA 3 ELEMENT FOLDED DIPOLE.
- 12) STUDY OF YAGI UDA 5 ELEMENT FOLDED DIPOLE.
- 13) STUDY OF YAGI UDA 5 ELEMENTS SIMPLE DIPOLE.
- 14) STUDY OF YAGI UDA 7 ELEMENTS SIMPLE DIPOLE.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
4ET503 Microwave Engineering	L	T	P	Max	100	50	50	50	250
Duration of Theory Paper: 3 hrs	4	-	2	Min	35	25	25	25	110

Course Objective: The objective of this course is to give students the knowledge and understanding of the basic concepts of Microwave and its components. It gives emphasis to the basic microwave components theories, modeling, analysis, design and also their physical behaviors.

Perquisites: Basic Knowledge of EMFT, Analog Electronic

COURSE OF CONTENTS

Unit I

Microwave components-microwave frequencies, devices, systems, units of measure, hybrid circuits, waveguide tees, magic tees (hybrid trees), hybrid rings (rat-race circuits), waveguide corners, bends and twists, directional couplers, two-hole directional couplers, ~~z & abcd parameters~~ introduction to s parameters, s matrix of a directional coupler, hybrid couplers, circulators and isolators, microwave circulators, microwave isolators.

Unit II

Microwave linear-beam tubes (o type) and microwave crossed-field tubes (m type) :limitations of conventional vacuum tubes, klystrons, reentrant cavities, velocity-modulation process, bunching process, output power, beam loading, multicavity klystron amplifiers, beam-current density, output current output power of 2-cavity klystron, 4-cavity klystron, reflex klystrons, velocity modulation, power output and efficiency, electronic admittance, helix TWTs, slow-wave structures, amplification process, convection current, axial electric field, wave modes, gain consideration, microwave crossed-field tubes, magnetron oscillators, cylindrical, coaxial and tunable magnetron.

Unit III

Negative resistance devices, transferred electron devices (teds) and avalanche transit-time devices: tunnel diode, gunn-effect diodes, gaas diode, background, gunn effect, RWH theory, differential negative resistance, two-valley model theory, high-field domain, modes of operation, LSA, INP, CDTE diodes, microwave generation, amplification, avalanche transit-time devices, read diode, physical description, avalanche multiplication, carrier, external current, output power, quality factor, impatt, trapatt and baritt diodes their physical structures, negative resistance, power output and efficiency microwave performance, parametric devices, physical structures, nonlinear reactance and manley - rowe power relations, parametric amplifiers, applications.

Unit IV

Strip lines and monolithic microwave integrated circuits-Microstrip lines, characteristic impedance, losses, quality factor, parallel strip lines, distributed lines, characteristic impedance, attenuation losses, coplanar strip lines, shielded strip lines, references, problems, monolithic microwave integrated circuits, introduction, materials, substrate materials, conductor materials, dielectric materials, resistive materials, monolithic microwave integrated-circuit growth, mimic fabrication techniques, fabrication example.

Unit V

Microwave communication and microwave measurements-~~microwave communication and their applications, microwave antennas,~~ slotted line vswr measurement, vswr through return loss measurements, power measurement, impedance measurement insertion loss and attenuation measurements- ~~measurement of scattering parameters~~ measurement of 1 db, dielectric constant measurement of a solid using waveguide. microwave and its applications in medical home industry etc.

References:

- [1].Samuel Y.LIAO, *Microwave Devices and Circuits*, 3/e, Prentice Hall of India-2003
- [2]. Annapurna Das and Sisir K.Das, *Microwave Engineering*, Tata McGraw-Hill -2000
- [3].R.E.Collin, *Foundations for Microwave Engineering*.,2/e, IEEE Press 2002
- [4].David M.Pozar, *Microwave Engineering*. 2/e,John Wiley & Sons 2003
- [5]P.A.Rizzi, *Microwave Engineering- Passive circuits* - PHI

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR7C4 RF AND MICROWAVE ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective:

- To give students the knowledge and understanding of the basic concepts of microwave and its components.
- To make students aware about the working and behavior of microwave vacuum tube devices and microwave solid state devices.
- To provide knowledge about the microwave strip lines, microwave integrated circuits fabrication process and microwave measurements.
- To make students aware about applications and hazards of microwave radiations

Prerequisite: Basic knowledge of EM field, transmission lines and Analog electronics

COURSE CONTENTS

UNIT-I

Microwave fundamentals – microwave frequencies, microwave devices, microwave systems, microwave units of measure, Scattering or S – matrix representation of multiport network, **microwave waveguides**, **microwave cavities**. Microwave hybrid circuit, waveguide tees, directional couplers, circulators and isolators.

UNIT-II

Microwave Vacuum Tube Devices – Limitations of conventional vacuum tubes in the microwave frequency range, Klystron amplifier, reflex klystron oscillator, travelling wave tube, Magnetron oscillator.

UNIT-III

Microwave semiconductor devices – microwave tunnel diode with its principles of operation and characteristics, Gunn-effect diodes, LSA diodes, Read diode, IMPATT, TRAPATT, BARITT diodes, parametric devices, parametric amplifiers.

UNIT-IV

Strip lines, monolithic microwave integrated circuits (MMIC) and microwave measurements- microstrip lines, parallel strip lines, coplanar strip lines, shielded strip lines, MMIC materials, MMIC growth, MOSFET fabrication, microwave test bench, power measurement, insertion loss and

attenuation measurements, VSWR measurements, return loss measurement by reflectometer, impedance measurement, frequency measurement.

UNIT-V

Application, hazards and some advance topics - Applications of microwave, microwave radiation hazards, introduction to millimeter waves and its applications, design and implementation of microwave and millimeter wave circuits and systems.

Learning Outcome:

After learning the course the students should be able to:

- Understand the basic concepts of microwave and its devices and components.
- Apply the knowledge of microwave to solve the microwave communication and microwave application based problems.
- Apply this knowledge for research in the field of microwave engineering.

BOOKS RECOMMENDED:

- [1] Samuel Y. Liao, *Microwave devices and circuits*, Third Edition, Pearson, 2003
- [2] Annapurna Das and S K Das, *Microwave Engineering*, Third Edition, McGraw Hill, 2015
- [3] R.E.Collin, *Foundations for Microwave Engineering*, 2/e, IEEE Press 2002
- [4] David M.Pozar, *Microwave Engineering*, 2/e, John Wiley & Sons 2003
- [5] P.A.Rizzi, *Microwave Engineering- Passive circuits* - PHI

List of Practical Assignments:

1. Learn how to operate microwave test bench.
2. To study the characteristics of the Reflex Klystron Tube and to determine its electronic tuning range.
3. To plot different Modes of the Reflex Klystron Tube.
4. To study V-I characteristics of Gunn diode.
5. To determine the different parameters of Isolators and Circulators.
6. To measure attenuation.
7. Measurement of scattering parameters of Magic Tee.
8. To Measure main-line and auxiliary-line VSWR, coupling factor and directivity of a multi-hole directional coupler.
9. Measurement of guide wavelength.
10. To plot directional pattern of horn antenna.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per Week			Marks					
4ET551 Circuit Design Using HDL	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	35	25	-	-	60

Course Objective: To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL. Perform synthesis, place, and route of a digital design into a target FPGA. Introduction of Analog and mixed signal design using VHDL-AMS

Prerequisite: Digital Design, C language.

COURSE OF CONTENTS

Unit I Introduction to VLSI and HDL

History of IC Design, IC Technology, Moore's Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic- Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski's Y Chart.

Digital system design process, Hardware simulation, Levels of abstraction, VHDL requirements, Elements of VHDL Top down design, VHDL operators, Timing, Concurrency, Objects and classes.

Unit II Behavioral Modeling

Signal assignments ,Concurrent and sequential assignments., Entity Declaration, Architecture Body, Behavioral Modeling, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers.

Unit III Dataflow and Structural Modeling Techniques

Data flow Modeling, Concurrent Assignment statements, Block statements, Resolution Functions, Structural Modeling, Component declaration and Instantiation, Generate statements.

Unit IV Advance Topics in VHDL

Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Attributes, ~~Hardware Modeling Examples: Modeling of digital circuits used in communication, signal conditioning and instrumentation blocks.~~

Unit V Design for Synthesis and Introduction to VHDL-AMS

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints, Synthesis for dataflow and structural models.

~~Introduction to VHDL-AMS, Free quantities, Terminal and Branch quantities, Attributes, Simultaneous statements, Analog structure description, Discontinuities and break statements, step specifications, Mixed signal description, Design Processing.~~

References:

- [1]. J. Bhasker, *VHDL Primer*, 3/e, Addison Wesley, 1999.
- [2]. Sudhakar Yalamanchili, *Introductory VHDL-From Simulation to Synthesis*, Pearson Education, 3/e Indian Reprint.
- [3]. Douglas Perry, *VHDL*, 3/e Edition, McGraw Hill 2001.
- [4]. Peter.J.Ashenden, *The Designer's Guide to VHDL-AMS*,
- [5]. Charles.H.Roth, *Digital system Design using VHDL*, Thompson Publishers, 2/e Edition, 2007.
- [6]. Ben Cohen, *VHDL-Coding style and Methodologies*, Kluwer academic Publishers, 1995.
- [7]. Volnei. A.Pedroni, *Circuit Design with VHDL*, MIT Press Cambridge, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)				
Subject Code & Name		Instructions Hours per Week			Credits			
ETR7E1 CIRCUIT DESIGN USING HDL		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Learning Objective: To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL. Perform synthesis, place, and route of a digital design into a target FPGA.

Prerequisite: Digital Design, C language.

COURSE CONTENTS

Unit I Introduction to VLSI and HDL

History of IC Design, IC Technology, Moore's Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic- Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski's Y Chart.

Digital system design process, Hardware simulation, Levels of abstraction, VHDL requirements, Elements of VHDL Top down design, **VHDL basic language Elements**, VHDL operators, Timing, Concurrency, Objects and classes.

Unit II Behavioural Modeling

Signal assignments ,Concurrent and sequential assignments., Entity Declaration, Architecture Body, Behavioral Modeling, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers.

Unit III Dataflow and Structural Modeling Techniques

Data flow Modeling, Concurrent Assignment statements, Block statements, Structural Modeling, Component declaration and Instantiation, Generate statements.

Unit IV Advance Topics in VHDL

Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Attributes.

Unit V Design for Synthesis

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints, Synthesis for dataflow and structural models.

Learning Outcomes:

At the end of the course, the students would be:

- Able to design digital systems through HDL language
- Simulation, synthesis and implementation of HDL code
- Implementation of code on FPGA/CPLD

BOOKS RECOMMENDED:

- [1]. J. Bhasker, *VHDL Primer*, 3/e, Addison Wesley, 1999.
- [2]. Sudhakar Yalamanchili, *Introductory VHDL-From Simulation to Synthesis*, Pearson Education, 3/e Indian Reprint.
- [3]. Douglas Perry, *VHDL*, 3/e Edition, McGraw Hill 2001.
- [4]. Peter.J.Ashenden, *The Designer's Guide to VHDL-AMS*,
- [5]. Charles.H.Roth, *Digital system Design using VHDL*, Thompson Publishers, 2/e Edition, 2007.
- [6]. Ben Cohen, *VHDL-Coding style and Methodologies*, Kluwer academic Publishers, 1995.
- [7]. Volnei. A.Pedroni, *Circuit Design with VHDL*, MIT Press Cambridge, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
4ET502 Digital Communication	L	T	P	Max	100	50	50	50	250
Duration of Theory Paper: 3 hrs	4	-	2	Min	35	25	25	25	110

Objectives: To introduce in-depth understanding of all the processes involved in digital communication systems.

Prerequisite: Knowledge of analog communication engineering and Fourier techniques.

COURSE CONTENTS

Unit I

Review of Fourier Techniques and Its Application For Linear System Analysis, Sampling & Quantization, Digital Coding Techniques, PCM, DPCM, ADPCM, DM, ADM, Vocoders, Line Coding NRZ, RZ, Biphasic, Duo Binary Etc., Their Comparison and Spectrum Associated with their Waveforms.

Unit II

Eye Patterns, Inter Symbol Interference, Pulse Shaping, ~~Complementary Error & Q Function, Chebyshev's Inequality.~~ Optimum Filter, Matched Filter, Maximum likelihood Receiver Structure,

Digital Modulation Techniques : Binary PSK, QPSK, M-Ary FSK, MSK Etc, Their Generation, Reception, Signal Space Representation, Performance Analysis & Comparison of Digital Modulation Techniques in Presence of noise.

Unit III

Information Theory & Channel Coding : Concept of Amount of Information, Entropy, Information Rate, Coding To Increase Average Information per Bit, Shannon Theorem & Its Application, Channel Capacity, Capacity of Gaussian Channel, Binary Symmetric Channel, Binary Erasure Channel, Calculation of Channel Capacity for different channels, Shannon Hartley Theorem, Bandwidth & S/N Trade Off.

Unit IV

Source coding techniques: Kraft Enequality, Shannon Fano and Huffman Coding. Error control coding : Linear Block Codes, Systematic Linear Blocks Codes, Parity Check Matrix, Syndrome Testing, Cyclic code, Hamming Code, BCH Code, Convolution Codes, maximum Likelihood Decoding, Viterbi decoding.

Unit V

~~Fading Channels – Small scale fading, Large scale fading, Signal Time Spreading, Time Variance of the Channel caused by the Motion, Mitigating the degradation effects of Fading. Equalization, Linear and Non Linear Equalization, Algorithms for adaptive Equalization, Diversity Techniques and its types.~~

References:

- [1] Taub & Schilling, Principles of Communication system, TMH.
- [2] Lathi B.P., Modern analog and Digital Communication systems, Oxford Uni. Press.
- [3] Haykins Simon, Digital Communication, Wiley Publication.
- [4] Proakis, Digital communication, McGraw Hill
- [5] Schaum's Outline series, Analog and Digital Communication.
- [6] B. Sklar, Digital Communication, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per week			Marks	TH	CW	SW	Pr	Total
4ET505 Wireless Communication	L	T	P	Max	100	50	-	-	150
Duration of Theory Paper: 3 hrs	4	-	-	Min	35	25			60

Course Objectives: To provide the knowledge of different generation mobile communication system, cellular concept and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite: It is expected to know the following concepts: Electromagnetic spectrum, analog and digital modulation techniques, channel coding, random variable and random process.

COURSE OF CONTENTS

Unit I

Introduction to wireless communication system, Concept of cellular mobile system, Frequency reuse, Channel assignment strategies, Handoff strategies, interference and system capacity, Trunking and grade of service improving coverage & capacity in cellular system.

Unit II

Multiple access techniques for wireless communications: FDMA, TDMA, CDMA. Packet radio protocols. Mobile radio propagation: Free space propagation model. Three basic propagation mechanisms: Reflection, Diffraction, Scattering, Brewster angle, ground reflection model, knife-edge diffraction model. Doppler Effect.

Unit III

Wireless systems and standards: GSM: Mobile services, system architecture, radio interface, Protocols, localization and calling, handover, security, Frame structure, GSM channel types New data services: HSCSD, GPRS, EDGE, DECT: System architecture.

Unit IV

Spread spectrum System: Fundamental concept of spread spectrum systems (DSSS and FHSS), Pseudo noise sequences, CDMA Principles of operation, forward and reverse CDMA channel. Wireless systems and standards: IS-95, CDMA 2000, WCDMA. Modulation Techniques for mobile radio: GMSK, spread spectrum modulation techniques. Orthogonal frequency division multiplexing. Multi Carrier and spread spectrum : ~~Multi-Carrier CDMA, Multi-Carrier DS CDMA, Multi-Tone CDMA.~~

Unit V

Fundamentals of channel coding, Block codes, Convolution codes. Speech coding for wireless system applications: ~~Introduction to DSP techniques in wireless telephone and broadcast system,~~ speech coding techniques for audio and voice: Waveform coders and Vocoders, Channel vocoder, Formant vocoder, Voice-Excited vocoder, Cepstrum vocoder, Liner predictive coders (LPC), Multipulse Excited LPC, Code Excited LPC, Residual Excited LPC.

References:

- [1]. Theodore S. Rappaport, *Wireless Communications principles and practice*, Prentice Hall of India, 2002.
- [2]. Kamilo Feher, *Wireless Digital Communications*, PHI Private Limited.
- [3]. Jochen H. Schiller, *Mobile Communication*, Pearson éducation
- [4]. William C.Y. Lee, *Wireless and Cellular Telecommunications*, Tata Mc-Grew Hill.
- [5]. Vijay K. Garg, *Wireless Network Evolution 2G to 3G*, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8C2 TELECOM NETWORKS	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The course contents are aimed to provide:

A detailed working of different telecommunication networks used for accessing broadband.

Prerequisites:

Knowledge of analog communication, digital communication and basics of computer networks.

COURSE CONTENTS

UNIT-I

Introduction : Classification of different wireless and wired telecommunication networks, their comparison, Broadband access, Classification of Legacy broadband technologies, Fixed wired broadband technologies, Fixed wireless broadband technologies, Mobile wireless broadband technologies, Overview of 2G, 3G, 4G & 5G networks, Telecommunication Traffic- unit of traffic, network traffic load and parameters, grade of service and blocking probability.

UNIT-II

Public switched telephone networks (PSTN): Various subsystems of PSTN - subscriber end instruments, subscriber loop systems, transmission system, signalling system, trunk networks. speech digitization, line coding, frame formats used in PSTN, switching.

UNIT-III

Integrated Services Digital Networks (ISDN): Evolution from PSTN, basic principles, architecture and reference points, various frame formats, protocol stack, ISDN services. Broadband ISDN architecture, protocol stack, cell format, BISDN services.

UNIT-IV

Digital subscriber line (DSL): Dial up internet connection, its shortcomings, wired broadband technologies : (DSL), its types ADSL, SDSL, VSDL etc. working principle of DSL, Discrete multi tone modulation, Cable modem & its working principle.

UNIT-V

Optical Access Network: comparison of optical access networks, DSL and cable modem, PON, EPON, GPON and WDMEPON: overview, principal of operation, architecture, standards; Hybrid Wireless-Optical Broadband Access Network

Learning Outcomes:

Upon completing the course, student will able to learn about various wired and wireless telecommunication networks used for broadband access, their comparison, technologies used in these networks.

Institute of Engineering & Technology				Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per Week			Marks					
4ET552 Optical Communication	L	T	P		TH	CW	SW	PR	Total
	Duration of paper: 3 hrs	4	0	2	Max	100	50	50	50
				Min	35	25	25	25	110

Course Objective: To provide the fundamentals of optical communication systems and its various elements.

Prerequisite: Knowledge of Electromagnetic fields & waves and basic concepts of Lasers and optical fiber

COURSE OF CONTENTS

Unit I

Introduction to optical fiber communication systems, Advantages of optical fiber communication over conventional electrical communication, review of optical fiber fundamentals, ray theory transmission, electromagnetic mode theory for optical propagation, cylindrical fiber; modes, mode coupling, step index fibers, graded index fibers, single mode fiber; cutoff wavelength, ~~mode field diameter & spot size, effective refractive index.~~

Unit II

Transmission characteristics of optical fibers; attenuation, material absorption losses in silica glass fibers, linear scattering losses, nonlinear scattering losses, fiber bend loss, dispersion; intermodal dispersion, intra modal dispersion, modal noise, overall fiber dispersion, dispersion shifted fiber.

Unit III

Optical sources: Lasers & LEDs; review of basic concepts, ~~semiconductor injection laser (injection laser diode), efficiency,~~ injection laser characteristics; threshold current temperature dependence, dynamic response, frequency chirp, noise, reliability, comparison of LED & Lasers. Optical detectors: optical detection principle, absorption, quantum efficiency, responsivity, long wavelength cutoff, pin photodiode, avalanche photodiode, ~~benefits and drawbacks with the avalanche photo diode.~~

Unit IV

~~Introduction to receiver, types of noise, receiver noise, p n & p i n photodiode receiver, APD receiver.~~ Optical Amplifiers; Semiconductor Optical Amplifiers (SOAs), Erbium doped fiber amplifiers, crosstalk in SOAs. ~~Nonlinear effects; self phase modulation, cross phase modulation, four wave mixing, solitons.~~

Unit V

WDM concepts & components- overview of WDM, passive optical couplers; 2X2 fiber coupler, star couplers, Mach Zehnder interferometer multiplexers, fiber grating filters, dielectric thin film filters.

References:

- [1]. John M. Senior, *Optical Fiber Communications: Principles and Practice*, LPE, Pearson Education-2006.
- [2]. Gerd Keiser, *Optical Fiber Communications*, Tata McGraw Hill Education Private Limited, New Delhi, 2008.
- [3]. Joseph C. Palais, *Fiber Optic Communication*, PHI.
- [4]. Gowar, *Optical Communication Systems*, PHI.

Devi Ahilya University, Indore, India				IV Year B.E. (Electronics and Telecommunication)			
Institute of Engineering & Technology							
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8C3	L	T	P	L	T	P	Total
OPTICAL COMMUNICATION	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: To understand fundamentals of optical communication system, its various elements, and optical networking

Prerequisites: Basic knowledge of electromagnetic theory

COURSE CONTENTS

UNIT-I

Introduction to optical fiber communication system, Advantages of optical fiber communication over conventional electrical communication, review of optical fiber fundamentals, ray theory transmission, electromagnetic mode theory for optical propagation in optical waveguides, Types of optical fibers: step index fibers, graded index fibers, single mode fibers etc., cut off wavelength

UNIT-II

Transmission characteristics: fiber attenuation, absorption and scattering losses, fiber bend loss, fiber dispersion, intermodal and intra-modal dispersion, overall fiber dispersion, dispersion shifted fibers, dispersion flattened fibers, non-zero-dispersion shifted fibers, **polarization maintaining fibers.**

UNIT-III

Optical sources: Lasers and LEDs: basic concepts, injection laser, characteristics, temperature dependence, dynamic response, noise, reliability, Optical detection principle, absorption, quantum efficiency, responsivity, large wavelength cut off, pin photodiode, avalanche photodiode, receiver: **basic concepts and types of noise.**

UNIT-IV

Optical networks: Basic principles and components, couplers, isolators, circulators, multiplexers: gratings, Fabry perot filters, multilayer dielectrics, Mach-Zehnder interferometer, Acousto-optic tunable filters, Optical amplifiers-Semiconductor optical amplifiers, Erbium doped fiber amplifiers, wavelength converters, optical switches, optical add-drop multiplexers

UNIT-V

Optical networks: architecture, Synchronous optical network/ synchronous digital hierarchy- elements, multiplexing, layers, frame structure, WDM network architectures, broadcast and select networks, wavelength routed networks, routing and wavelength assignment (RWA), access networks, Optical OFDM, Flexible optical networks

Learning Outcomes:

Upon completing the course, students will be well versed with the fundamental concepts of optical communication, and will be able to contribute to the current and upcoming advances in the technology.

BOOKS RECOMMENDED:

- [1] John M Senior, Optical fiber Communication: Principles and Practice, Pearson Education -2006
- [2] Gerd Keiser, Optical fiber communication, Fifth Edition McGraw Hill Education (India), 2013
- [3] Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks : A Practical Perspective", Harcourt Asia Pte Ltd., Second Edition 2004.
- [4] C. Siva Ram Moorthy and Mohan Gurusamy, "WDM Optical Networks : Concept, Design and Algorithms", Prentice Hall of India, 1st Edition, 2002

List of Practical Assignments:

- 1) To set-up a fiber optic analog link
- 2) To set up a fiber optical digital link
- 3) To obtain intensity modulation of an analog signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- 4) To obtain intensity modulation of a digital signal, transmit it over a fiber cable and demodulate it at the receiver and to get back original signal
- 5) To study the frequency modulation in case of fiber optic communication system.
- 6) To undertake the pulse width modulation in case of fiber optic communication system.
- 7) To determine the propagation losses in case of optical fiber communication system.
- 8) To evaluate bending losses in case of optical fiber communication system.
- 9) To determine the numerical aperture of an optical fiber
- 10) To study the characteristics of frequency modulation in case of fiber optic communication system.
- 11) To plot the electrical to optical conversion characteristics

Institute of Engineering & Technology				Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
4ET554 Satellite Communication & Navigation Systems	4	0	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	35	25	25	25	110

Course Objective: Students should get knowledge about satellites, their various aspects and about satellite communication. Different access techniques used and Navigations aids provided by satellites.

Prerequisite: Digital Communications, Antenna and Wave Propagation.

COURSE OF CONTENTS

Unit I

Introduction to satellites, ~~Kepler's First Law~~ ~~Kepler's Second Law~~ ~~Kepler's Third Law~~ ,Satellite orbits- LEO,MEO,HEO,cicular,,elliptical orbits, Definitions of Terms for Earth orbiting Satellites- Orbital Elements - Apogee and Perigee Heights- Orbital Perturbations - Effects of a Nonspherical Earth- Atmospheric Drag-, Calendars- Universal Time- Julian Dates- Sidereal Time-, Frequency Allocations for Satellite Services- Intelsat- U.S.Domats- Polar Orbiting Satellites- Problems

Unit II

Look angle determination ,Launches and launch vehicles, Launching Orbits -, orbital effects in communication system performance, ~~Limits of Visibility~~ ~~Near Geostationary Orbits~~ ~~Earth Eclipse of Satellite~~ ~~Sun Transit Outage~~ ~~Problems~~-, satellite subsystem Attitude and orbit control system, Telemetry, tracking, command and monitoring system, Power system, Communication subsystem, - Antenna Subsystem, ~~Control~~ ~~Spinning Satellite Stabilization~~ ~~Momentum Wheel Stabilization~~ ~~Station Keeping~~ ~~Thermal Control~~ ~~Transponders~~ ~~Wideband Receiver~~.

Unit III

Satellite link design- ~~Fixed Atmospheric and Ionospheric Losses~~- Link Power Budget Equation - System Noise - Antenna Noise - ~~Amplifier Noise Temperature~~ ~~Amplifiers in Cascade~~ ~~Noise Factor~~ ~~Noise Temperature of Absorptive Networks~~ - Overall System Noise Temperature - Carrier-to-Noise Ratio - Uplink - ~~Saturation Flux Density~~ ~~Input Back Off~~ ~~The Earth Station HPA~~ ~~Downlink~~ ~~Output Back off~~ ~~Satellite TWTA Output~~ ~~Effects of Rain~~ ~~Uplink rain fade margin~~ ~~Downlink rain fade margin~~ ~~Combined Uplink and Downlink C/N Ratio~~ ~~Intermodulation Noise~~.

Unit IV

Preassigned FDMA, Demand-Assigned FDMA, ~~SPADE System~~. ~~Bandwidth limited a Power limited TWT amplifier operation~~, ~~FDMA downlink analysis~~. TDMA : Reference Burst; ~~Preamble and Postamble~~, ~~Carrier recovery~~, ~~Network synchronization~~, ~~unique word detection~~, ~~Traffic Date~~, ~~Frame Efficiency and Channel capacity~~; preassigned TDMA, Demand assigned TDMA, ~~Speech Interpolation and Prediction~~, ~~Downlink analysis for Digital transmission~~. ~~Companion of uplink Power requirements for FDMA & TDMA~~. ~~On board signal processing for TDMA / FDMA operation~~, ~~Satellite switched TDMA~~. Code-Division Multiple Access - Direct-Sequence spread spectrum - ~~code signal $e(t)$~~ ~~autocorrelation function for $e(t)$~~ ~~Acquisition and tracking~~ ~~Spectrum spreading and dispreading~~ ~~CDMA throughput~~ ~~Problems~~, ~~Internet using satellites~~.

Unit V

Satellites and Navigational aids, Radio and satellite navigation, GPS- Global Positioning Satellite, GPS location GPS receivers and codes, ~~satellite signal acquisition~~ ~~GPS navigation message~~, ~~GPS signal levels~~, ~~time accuracy~~, ~~GPS receiver operation~~, ~~Differential GPS Mobile Services~~ - VSATs - Radarsat - Orbecomm. DTH-(direct to home)

References:

- [1]. Timothy Pratt - Charles Bostian & Jeremy Allmuti, *Satellite Communications*, John Willy & Sons (Asia) Pvt. Ltd.
- [2]. Dennis Roddy, *Satellite Communications*, McGraw-Hill Publication
- [3]. Wilbur L. Pritchards Henri G.Snyder Hond Robert A.Nelson, *Satellite Communication Systems Engineering*, 2/e, Pearson Education Ltd., 2003.
- [4]. M.Richharia, *Satellite Communication Systems Design Principles*, 2/e, Macmillan Press Ltd.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Electronics and Telecommunication)				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8C4	L	T	P	L	T	P	Total
SATELLITE AND NAVIGATION SYSTEM	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objective: The curriculum focuses on following learning objectives:

- To get acquainted with satellite communication system and its importance.
- To understand the concepts of satellite orbit, launching mechanisms, launch vehicles, types of satellites and various access techniques.
- After learning this course student will get the knowledge of satellite link design and fundamentals, power and bandwidth requirement, effect of the transmission medium etc.
- (iv) Student will be familiar with regulatory aspects and standards, various applications of satellite and navigation system, and some value added examples.

Prerequisite: Knowledge of Digital Communication and Wireless Communication

COURSE CONTENTS

UNIT-I

Introduction to Satellite Communication: Evolution of satellites and launch vehicles, basic concept and overview of satellite communication system, comparison with other communication system, various types of satellites and their applications, recent trends in satellite communication system.

Orbital Mechanics: Orbit and trajectories, Orbiting satellites: basic principles and equation of the orbit, Orbital parameters: definition and calculation, injection velocity and resulting satellite trajectories, types of satellite orbits.

UNIT-II

Satellite Launch and In-orbit Operations: Launch sequence and its types, launch vehicles, orbital perturbations: longitudinal and inclination changes, satellite stabilization, orbital effects on communication system performance, look angles: definition and determination, sub satellite point, calculation of elevation and azimuth angle, specialization to geostationary satellite, visibility test.

The Space Segment: Satellite sub systems, Altitude and orbit control system, telemetry, tracking, command and monitoring, power system, communication subsystems-transponders, satellite antennas, space qualification and equipment reliability.

UNIT-III

Satellite Link Design: Basic transmission theory, Link parameters, frequency considerations, propagation considerations- Introduction, atmospheric losses, ionospheric effects, rain attenuation, other propagation impairments, noise considerations- Thermal noise, Noise figure, Noise temperature, Noise figure and noise temperature of cascaded stages, Antenna noise temperature, Overall system noise temperature, interference related problems, G/T ratio, C/N ratio, Link Design: design procedure and link budget, design of uplink and downlink, combined uplink and downlink C/N ratio, link budget examples for C band, Ku band and Ka band.

The Earth Segment: Earth station, types of earth station, architecture of Earth station, Earth station Design considerations and optimization.

UNIT-IV

Modulation and Multiplexing Techniques for Satellite Links: Amplitude modulation, frequency modulation, Carson's rule, analog FM transmission by satellite, digital modulation and demodulation, Digital transmission of analog signal, multiplexing techniques: Frequency division multiplexing and time division multiplexing.

Satellite Access: Introduction to multiple access techniques, Frequency division multiple access: Preassigned and demand assigned, calculation of C/N ratio, Time Division Multiple access: Introduction, TDMA Frame structure, TDMA Burst structure Computing unique word detection probability, TDMA frame efficiency, Code Division Multiple Access: Frequency hopping(FH), Time hopping(TH), Comparison of FH-CDMA and TH CDMA, Space Domain Multiple Access.

UNIT-V

Satellite Applications: VSAT Systems-overview, network architecture, access control protocols, modulation and multiple access selection, VSAT earth station and calculation of link margin.

Low earth orbit and Non Geo –stationary satellite systems: Orbit consideration, coverage and frequency consideration, delay and throughput considerations, system considerations.

Direct Broadcast Satellite Television and Radio: Digital DBS TV system design and link budget

Satellite navigation and the Global Positioning System: Introduction, radio and satellite navigation, GPS position location principles, GPS receivers and codes-C/A code.

Learning Outcome:

After learning the course the students should be able to:

- (i) To analyze satellite sub systems, space segment and Earth segment.
- (ii) To design communication link for various types of satellite systems.
- (iii) To understand and design various satellite applications.

BOOKS RECOMMENDED:

- [1].A. Maini, V. Agrawal, "Satellite Communications", Wiley India Pvt. Ltd., 2013.
- [2].T. Pratt, C. Bostain, J. Allnutt, 'Satellite Communications', Second Edition, John Wiley & Sons, 2003.
- [3].M.Richharia, 'Satellite Communication Systems-Design Principles', Macmillan 2003.

List of Practical Assignments:

1. Determination of orbit for a given eccentricity using Kepler's equation.
2. Computing the orbit of satellite by providing the satellite orbital parameters.
3. Calculation of look angle (Azimuth angle and elevation angle) with the help of given latitude and longitude of earth station as well as sub-satellite point.
4. Calculation of EIRP for earth station and satellite transponder and C/N ratio at the satellite and earth station receiver.
5. Obtain the autocorrelation of an input sequence applied at the Earth Station.
6. Obtain the waveforms for input signal, sampled signal, time division multiplexed signal and recovered signal for satellite communication.
7. Obtain the waveforms for BPSK modulation and demodulation in satellite communication.
8. Obtain the waveforms for QPSK modulation and demodulation in satellite communication.
9. Simulate Code Division Multiple Access for satellite communication of N transmitter/receiver pair.
10. Link budget analysis of transponder by obtaining the graph of C/N ratio v/s Pt and Pr.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Telecommunication)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR8E1 INTERNET OF THINGS	L 3	T 1	P 2	L 3	T 1	P 1	Total 5
Duration of Theory Paper: 3 Hours							

Learning Objective:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

Prerequisite: Computer Network, C Language

COURSE CONTENTS

Unit I

IoT Introduction, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Unit II

Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Unit III

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.

Unit IV

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of IoT Security, Common Challenges in IoT Security, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment

Unit V

IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

Learning Outcomes:

At the end of the course, the students would be:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.

- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

BOOKS RECOMMENDED:

- [8]. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education
- [9]. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.
- [10]. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
- [11]. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017.

List of Practical Assignments:

1. To study the architecture of application board of Raspberry Pi.
2. To demonstrate the OS (Debian) for RPi in a SD card preparation, configuration of Raspberry Pi during first booting and use of remote SSH like putty
3. To demonstrate the basic linux commands on Raspberry pi.
4. To create a database & Store the value in Raspberry Pi.
5. To install Android on Raspberry Pi.
6. To Setup R Pi first time without using screen, mouse, keyboard.
7. To interface ADC at GPIOs of Raspberry Pi for measuring analog voltage.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Telecommunication					
Subject Code & Name	Instructions Hours per Week			Marks					
4ET553 IC Design Techniques	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	35	25	25	25	110

Course Objective: This course presents the fundamental of analog and Digital CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite: Knowledge of semiconductor devices is required.

COURSE OF CONTENTS

Unit I

VLSI design flow, VLSI design style, introduction to the basic fabrication processes (wafer preparation, oxidation, diffusion, etching, metallization and lithography, etc.), Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor.

Unit II

Threshold voltage equation and energy band diagram of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ration, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances. Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter

Unit III

Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation. Limitations of CMOS in NANO scale circuit design.

Unit IV

CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit V

~~Basic concept of analog VLSI design, Common source stage, source follower, single ended and differential operation, common mode response, active current mirror, frequency response of amplifier, introduction to the operational amplifier.~~

References:

- [1]. Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*,
- [2]. Tata McGraw-Hill, 3/e.
- [3]. Behzad razavi, *Design of Analog CMOS Integrated Circuit*, Tata McGraw Hill, 11th reprint, 2006.
- [4]. R. Jacob Baker, Harry W. Li and David E. Boyce, *CMOS Circuit design, layout and Simulation*, PHI, IEEE press, Series Edition,
- [5]. Yuan Taur and Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Cambridge university Press, Special Edition, 1998
- [6]. Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, PHI, 2/e
- [7]. Jan M. Rabaey, *Digital Integrated Circuit*, PHI, 2/e

Academic Year: July-2016 to June-2017
 Programme: B.E II

Branch : Information Technology

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	21T451	Discrete Structures	AIR3C1	Discrete Mathematics	30%
2	21T454	Object Oriented Programming	ITR3C2	Object Oriented Programming	0%
3	21T402	Data Structures	ITR3C3	Data Structures	12%
4	2E1404	Digital Electronics	ITR3C4	Digital Electronics	10%
5	21T405	Digital Computer Organization	ITR3G1	Computer Organization & Architecture	30%
6			SIR3S3	Life Management Skills	100%
7	2AN1401	Applied Mathematics-III	AIR4C1	Numerical & Optimization Techniques	10%
8	31T402	Operating System	ITR4C2	Operating Systems	5%
9	31T405	Software Engineering	ITR4C3	Software Engineering	8%
10	31T404	Database Management System	ITR4C4	Database Management System	10%
11	3ET455	Digital Communication Engineering	ITR4G2	Digital Communication Engineering	10%
12	2SS007	Effective Communication Skills	SIR4S4	Communication Skills	10%
13	21T403	Business Data Processing			
14	2ET455	Microprocessor & Assembly Language Programming			
15	2SS057	Engineering Economics			
Average % change in BE program = Total average / 4 =					20%
Average % change =					5.00%

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Academic Year: July-2017 to June-2018
 Programme: B.E III

Branch : Information Technology

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	31T401	Theory of Computation	ITR5C1	Theory of Computation	30%
2	41T452	Object Oriented Design	ITR5C2	Object Oriented Analysis & Design	50%
3	31T403	Computer Network	ITR5C3	Computer Networks	5%
4	31T454	Web Engineering	ITR5E1	Web Technologies	90%
5			ITR5G3	Applied Statistics	100%
6	3SS406	Principles of Management	SIR5S5	Principles of Management	80%
7	41T454	Wireless Protocols and Mobile Networks	ITR6C1	Wireless Protocols and Mobile Networks	50%
8	31T452	Analysis of Algorithms	ITR6C2	Design and Analysis of Algorithms	10%
9	41T453	Network and Information Security	ITR6C3	Network and Information Security	0%
10			ITR6E1	Software Testing and Quality Assurance	100%
11	21T453	System Programming	ITR6G4	Compiler Design	75%
12	3SS456	Entrepreneurship Development & IPR	SIR6S6	Entrepreneurship Development & IPR	70%
13	31T453	Server Side Programming			
Average % change in BE program = Total average / 4 =					Average % change =
					55%
					13.75%

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Prudhvi

Pransel

Shiraf

Amal

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Sem-6

Sem-5

Academic Year: July-2018 to June-2019
 Programme: B.E. VII Sem

Branch : Information Technology

S.No	Course Code	Old Scheme		New(CBGS) Scheme 2015		Percentage of Syllabus Change
		Course Name	Course Code	Course Name	Course Code	
1	41T401	Project -II	ITR7PR	Project Phase-I/Project Phase- II		
2	41T458	Cloud Computing	ITR7C1	Cloud Computing		10%
3	21T452	Computer Graphics	ITR7C2	Computer Graphics		0%
4	41T414	Big Data Analytics	ITR7E1	Big Data Analytics		10%
5	41T402	Artificial Intelligence	ITR7G5	Artificial Intelligence		12%
6	41T403	Enterprise Computing Techniques				
7	41T404	Very Large Databases				
8	41T451	Multimedia Computing				
9	41T405	Software Architecture				
10	41T458	Information Retrieval & Extraction				
Average % change in BE program = Total average / 4 =						8%
Average % change =						2.00%

Sem-7

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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		Th	CW	S W	Pr	Tota l
2IT451 Discrete Structures	4	-	-	Max	10 0	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: To provide the fundamentals of formal techniques for solve the problems in computational domain and algorithm development

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Set Theory & Logic

Set theory: ~~Set representation~~; Set operations and Algebra; Principle of Inclusion-Exclusion.

Mathematical induction: Strong induction; Well-ordering; Recursive definitions.

Propositional Logic: ~~Representation~~; Logic connectives; ~~Truth tables~~; ~~Deduction~~; ~~Sylogism~~; ~~Arguments~~.

Unit-II

Counting: ~~Fundamental laws of product and sum~~; ~~Permutations & Combinations~~. ~~Other counting techniques~~; ~~Combinatory~~.

Relations: Relations and their properties; ~~n-ary relation and their applications~~; Representing binary relations; Closures of relations; Equivalence, Partial ordered and ~~Compatible relations~~.

Function: ~~Types of functions~~; Hashing; Pigeon-hole principle.

Unit-III

Graph Theory: Terminology; Graph Representation; Graph isomorphism; Connectedness; Various graph properties; Euler & Hamiltonian graph; shortest paths algorithms.

Trees: Terminology; Tree traversals; prefix codes; Spanning trees; Minimum spanning trees.

Unit-IV

Overview of the topics: ~~Automata & Grammar~~; ~~Analysis of algorithms~~; Generating functions; Recurrence Relations; ~~Fuzzy logic~~.

Unit-V

Algebraic system-I: Groups & Group Codes; Rings, Fields & Integral domains.

Algebraic system-II Lattices and Boolean algebra: ~~Gate Algebra~~; ~~Logic Algebra~~; ~~Switching Algebra~~.

BOOKS RECOMMENDED

- [1] C L Liu, *Introduction to Discrete Mathematics*, McGraw-Hill, 1986 (Reprint by Tata McGraw Hill, 2007).
- [2] K Rosen, *Discrete Mathematics and its Applications*, 6/e (Special Indian Edition), Tata McGraw-Hill, 2007.
- [3] B Kilman, R Busby, S Ross, N Rehman, *Discrete Mathematical Structures*, 5/e, Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BEII Year (Information Technology) Semester III			
Subject Code & Name	Instructions Hours per Week			Credits			
AIR3C1 Discrete Mathematics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To introduce students to ideas and techniques from discrete mathematics that are widely used in Computer Science.
- Provide the fundamentals of formal techniques for solving the problems in mathematical reasoning, combinatorial analysis, discrete structures, algorithmic thinking, and applications and modelling.

Prerequisites: Nil.

Course Contents

Unit-I

Sets: Algebra of sets, laws of sets, computer representation, cardinality of a set, principle of inclusion-exclusion.

Functions: Characteristic function of a set, floor and ceiling functions, mod function, hashing function.

Relations: Binary Relation, properties, closure of a relation, equivalence and partial order relations, partially ordered set, Hasse Diagram, totally ordered set, maximal and minimal elements, upper bound, lower bound, greatest lower bound and least upper bound, lattice, sub lattice, properties of lattices, distributive lattices, complemented lattices, modular lattices, topological sorting.

Unit-II

Propositional Logic: Proposition, logical connectives, bit operations, conditional and bi-conditional propositions, logical equivalence, algebra of propositions, tautology, contradiction and contingency, normal forms, logic in proof, predicates and quantifiers, rules of inferences, Applications of propositional logic to logic puzzles, Boolean searches, logic circuits and system specifications.

Unit-III

Mathematical Induction: Strong induction, well-ordering, Recursive definitions.

Advanced Counting techniques: Pigeon-hole principle, sequences and summations, generating functions.

Recurrence relations:-Formation, methods of solution and application.

Unit-IV

Graph Theory: Terminology, graph representation-incidence and adjacency matrices, walk, path, cycle, graph isomorphism, connectedness, Euler & Hamiltonian graphs, planar graph, graph coloring, shortest paths algorithms.

Trees: Terminology, spanning trees, minimum spanning trees, tree traversals; prefix codes.

Unit-V

Binary operation, groupoid, semi group, monoid, group, subgroup, cyclic group, permutation group,

definition and examples of Rings, Integral domain and Fields; Application to coding theory.

Boolean Algebra-Definition, laws of Boolean algebra, Boolean functions, sum of products and product of sum form, normal form, simplification of Boolean function by algebraic method, Boolean expression for logic and switching network, Karnaugh Map Method for simplification of Boolean expressions.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn a particular set of mathematical facts and know how to apply them.
- Think logically and mathematically.
- Use and analyze recursive definitions.
- How to count some different types of discrete structures.
- Techniques for constructing mathematical proofs and to reason about the efficiency of an algorithm.

Books Recommended:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th ed., Tata McGraw-Hill Edition 2007.
2. Kolman, Busby & Ross, Discrete Mathematical Structures, 6th edition, Pearson Education, 2008.
3. C.L.Liu, Introduction to Discrete Mathematics, McGraw Hill, 1986.
4. Trembley and Manohar, Discrete Mathematical structures for Computer Science, McGraw Hill, 1986.
5. Edgar G. Goodaire, Michael M. Parmenter, Discrete Mathematics with Graph Theory, 3rd edition Prentice Hall, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester IV						
Subject Code & Name		Instructions Hours per Week			Marks					
2IT454 Objec Oriented Programming		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objectives: To familiarize with the Object oriented concepts through Java programming.

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Introduction to Object Oriented Programming: Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

Unit-II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

Unit-III

Inheritance and Polymorphism: Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

Unit-IV

Exception Handling and Multithreading: Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle.

Unit-V

Java I/O, Applets and Event Handling: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

BOOKS RECOMMENDED

- [1] Cay S.Horstmann, *Core JAVA Vol-1*, Pearson Education.
- [2] Herbert Schildt, *The complete Reference*, Tata McGraw Hill
- [3] Scott W Amber, *the Object Primer*, Cambridge
- [4] Timothy, Budd, *Object Oriented Programming*, Pearson Education.
- [5] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, O'Reilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) Semester IV			
Subject Code & Name	Instructions Hours Per Week			Credits			
ITR3C2 Object Oriented Programming	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To provide the knowledge of Object Oriented Programming Paradigm.
- To learn basic constructs of programming language that are implementing tools for object oriented program development.
- To develop skill to analyze and code for problem solution in object oriented approach.

Pre-requisites: Computer Programming

Course Content

UNIT-I

Introduction to Object Oriented Programming: Object Oriented Concepts, Merits of Object Oriented Technology. Abstraction, Encapsulation, Information Hiding. Object Model: definition, State, behavior, Identity and messages. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods. Introduction to object model of software development.

UNIT-II

Introduction to Java classes and objects: Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. String Handling, Wrapper classes: Arrays and Vectors.

UNIT-III

Inheritance and Polymorphism: Class relationships: Inheritance and its types, Merits and Demerits. Association. Association inheritance, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and Packages.

UNIT-IV

Exception Handling and Multithreading: Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating custom exceptions. Multithreading: Introduction, Priorities and scheduling, **Inter-thread communication**, Thread Synchronization and its life cycle.

UNIT-V

Java I/O, Applets and Event Handling: Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Analyze and code the solution to problem using object oriented paradigm.
- Understand Java language constructs.
- Apply object model for software development

BOOKS RECOMMENDED:

- Cay S.Horstmann, *Core JAVA Vol-1*, 9/e, Pearson Education 2012.
- Herbert Schildt, *The complete Reference*, 9/e, Tata McGraw Hill 2014.
- Scott W Amber, *The Object Primer*, 3/e, Cambridge 2004.
- Timothy Budd, *Object Oriented Programming*, 3/e, Pearson Education 2002.
- Kathy Sierra, Bert Bates, *Head First Java*, 2/e, Oreilly Publications 2005.

List of Practical Assignment:

1. Experiments to understand program development environment for Java language.
2. Writing program to learn basic language constructs like identifier, variables, data types and console input/output..
3. Writing program to learn control statements.
4. Writing program to use class and objects to model problem domain entity in program domain.
5. Writing program to use inheritance and polymorphism features.
6. Programs to use exception and understanding modeling errant condition in execution as class and objects.
7. Experiments to learn Multi-Thread execution.
8. Writing program to code applications needing concurrency and exploring inter-thread communication mechanism.
9. Experiments to understand stream concept and study various stream abstractions and implementation available in the language
10. Exploring GUI components and understanding Event Delegation Model. Understanding (GUI) objects and their communication based program to realize object oriented programming in action.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester III					
Subject Code & Name	Instructions per Week		Hours	Marks					
2IT402	L	T	P		TH	CW	SW	PR	Total
Data Structures	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: To gain the knowledge of useful data structures, their implementations, and associated algorithms

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Array and Link list: Array: Definition, Representation, Address Calculations; Searching: Linear search, Binary search, Hash Search; Sorting: Bubble sort, Insertion sort, Selection sort, Heap sort, Quick sort, Merge sort, Link List: Introduction, Single Link list, Single Circular link List, Doubly link list, Doubly Circular link list, Applications of link list.

Unit-II

Stack: Definition, Representations: static and dynamic, Infix, Prefix, and Postfix expressions, Conversion of Infix to Postfix, Evaluation of Postfix expression, Implementation of recursion; ~~removal of recursion.~~

Unit-III

Queue: Definition, Representations: Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, and Implementation of Priority Queue using Heap data structure, applications of queues.

Unit-IV

Tree: Definition, Basic terminology, Binary tree, Complete Binary Tree, Full Binary Tree ; representations: Static and dynamic, Traversing in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree, B⁺tree, B*tree; ~~Applications of tree.~~

Unit-V

Graph: Definition, Basic terminology, Directed and Undirected graph, Connected and Disconnected Graph, Weighted graph, Representations: static, dynamic and mix; Searching in graphs, finding shortest path in a weighted graph, Applications of graph.

BOOKS RECOMMENDED

1. E Horowitz & Sahni, *Fundamental Data Structure*, Galgotia Book Source, 1983.
2. A Tannenbaum, *Data Structure Using C*, Pearson Education.
3. Kruz, *Data Structure and Programming Design*, 1987.
4. N. Wirth, *Algorithms + Data Structure = Program*, Prentice Hall of India, 1979.
5. A V Aho, J E Hopcroft & J D Ullman, *The Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3C3 DATA STRUCTURES	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide the knowledge of basic data structures and their implementations.
2. To understand importance of data structures in context of writing efficient programs.
3. To develop skills to apply appropriate data structures in problem solving.

Prerequisites: Computer Programming knowledge

COURSE CONTENTS

UNIT-I

Arrays and List: Array: Definition, Representation, Address Calculation; Searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Selection sort, Radix sort, Shell sort; List: Introduction, Implementation as Linked list, Circular linked List, Doubly linked list, Applications of linked list.

Unit-II

Stacks: Definition, Representations : static and dynamic, **Implementation of stack**, Applications of stack: Polish notation representation and conversion, **Tower of Hanoi problem**, Implementation of recursion, Quick sort and Merge sort.

Unit-III

Queues and Hashing: Definition, Representations, Static and dynamic, Circular Queue, Double ended Queue, Priority Queue, Implementation of Priority Queue using Heap data structure, Heap Sort, applications of queues. **Hash Structures: Representation, Search and Implementation and other issues.**

Unit-IV

Trees: Definition, Basic terminology, Binary tree, Complete Binary Tree, representations: Static and dynamic, Traversal techniques in binary tree, Heap tree, Binary Search tree, AVL tree, M-way search trees, B-tree & its variations.

Unit-V

Graphs: Definition, Basic terminology, Graph Types, Representations: static, dynamic; Implementations, Searching in graphs, Shortest path in graphs, Applications.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Learn the basic types for data structure, implementation and application.
- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem..
- Develop programming skills which require to solve given problem.

BOOKS RECOMMENDED:

1. A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.
2. Kruz, Data Structure and Programming Design, 1987.
3. N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.
4. Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

List of Practical Assignments:

1. Implementation of searching and sorting techniques.
2. Implementation of list using array and linked list.
3. Implementation of push and pop operation on stack
4. Implementation of polish notation and its conversion
5. Write a program to solve the problems using iteration/recursion
6. Program for recursion removal using stack
7. Program for insertion /deletion operation on various queue & Implementation of priority queue for process scheduling
8. Program for storing data as tree structure and implementation of various traversal techniques
9. Program for storing data as graph structure and implementation of various traversal techniques
10. Program for finding shortest path in graph.
11. Learn use of suitable data structures for solving problems: Maze, Polynomial Arithmetic, Tower of Hanoi etc.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester III						
Subject Code & Name		Instructions Hours per Week			Marks					
2EI404-Digital Electronics		L	T	P		TH	CW	SW	PR	Total
		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: Get acquainted with different number systems, their Interconversion and operations. Familiarized with different logic families & relative performance Ability to design various combinational circuits by solving & reducing Boolean equations Ability to synthesis, design and analysis of sequential circuits using Xilinx tools. Understandability of converting analog signal to digital and vice versa. Synchronization and frequency division circuits. Ability to test digital circuits and estimating reliability.

Prerequisite(s): Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

COURSE OF CONTENTS

Unit –I

Data Representation: Introduction to Binary System: Number System, Number base conversion, Binary Arithmetic, Various Binary codes, Logic Families: - RTL, DTL, ECL, IIL, TTL & CMOS families

Unit-II

Combinational Circuits: Combinations Logic, Design principles, Analysis and Synthesis Tools & Techniques, Combinational logic design practices like, combinational PLDs, Decoders, Encoders, 3-state Devices, Arithmetic Circuits like Adder, Subtractor, Multiplier, Divider, Comparators for signed and unsigned numbers ~~Practical Designing of combinations circuits design using EDA Software~~

Unit-III

Sequential Circuits: Sequential Logic Design Practices: Latches and Flip-Flops, Sequential PLDs, Counters, Shift Registers. Sequential Design Methodology, Impediments to Synchronous Design, Synchronizer Failure and Met stability. ~~Sequential Circuit Design Examples Using EDA Software~~

Unit-IV

Registers: Shift Registers, Universal Shift Registers, Shift-Register Counter, Sequence Generators. Memory Devices: Classifications, Static and Dynamic RAM, ROM, Memory Decoding & Expansion CPLDs and FPGAs: Xilinx family, function block architecture, programmable interconnects.

Unit-V

Digital Circuits: Digital to Analog Conversions: using Pulse width Modulator, Oversampling DAC, Binary Weighted DAC, R-2R Ladder, Thermometer Coded DAC, Segmented DAC, Hybrid DAC.

Analog to Digital Conversions: using Direct Conversions, Successive Approximations, Delta Encoded, Ramp Compare, Pipeline Method, Sigma Delta methods.

Counting and Timing Circuits: Using decade counters with & without feedback, vernier counting Synchronization and Frequency division circuits: using sweep circuits, stable & Monostable Relaxation circuits, study of sine wave synchronization.

Monostable, Bistable & Astable multivibrators: using 555, transistor Testing of Digital Circuits: Tools, Design of Testability, Estimating Digital system Reliability, Transmission lines, reflections and termination.

BOOKS RECOMMENDED

- [1] ~~John F. Wakerly, *Digital Design: Principles & Practices*, Low Price Edition, Pearson Education, 2003~~
- [2] ~~Richard F. Tinker, *Engineering Digital Design*, 2/e, Harcourt India Private Ltd., 2001~~
- [3] William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
- [4] William H. Gothmann, *Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition, Prentice-Hall of India Private Limited, New Delhi., 2001
- [5] ~~Jacob Millman & Herbert Taub, *Pulse, Digital and Switching Waveforms*, 13th Reprint, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) Semester IV				
Subject Code & Name		Instructions Hours per Week			Credits			
ITR3C4 Electronics	Digital	L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours								

Learning Objectives:

- To provide knowledge of different data representation systems for digital computers.
- Familiarize students with different hardware implementation techniques of different logic functions.
- Develop skills to design and implement various combinational and sequential circuits
- Develop ability to implement digital circuits in various practical applications.
- Provide knowledge of data converters and basic understanding of Microprocessors

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's-speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

UNIT-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices, Combinational circuit design for Adder, Subtractor, Comparator, Code converters

UNIT-III

Sequential Circuits: Latches and Flip-Flops SR, D, T, JK, Master-slave , Flip- Flop conversions, Synchronous counter, Asynchronous counter, Up-Down Counter

UNIT-IV

Registers: Shift Registers, serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register, Sequence Generators, Designing of Synchronous & Asynchronous sequential circuits.

UNIT-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, Conversions as Flash type, Counter type , Successive Approximations type A/D converter, Clock generation through IC555, Memory- Types ROM, RAM, Introduction to Microprocessor, Microprocessor Evaluation, Programming and hardware model of Microprocessor, 8/16/32/64 bit Series of Microprocessors.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand how to represent data in digital form.
- Understand driving capacity of a gate and voltage-current parameters
- Design and Analyse any combinational and sequential digital circuit
- Using analog to digital and digital to analog IC's for data conversion.
- Understand basics of microprocessors

BOOKS RECOMMENDED:

1. Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
2. William H. Gothmann, *Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition, Prentice-Hall of India Private Limited, New Delhi, 2001
3. William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
4. S Salivahan, S Arivazhagan "Digital Circuit and Design" Vikas Publication
5. Ramesh S. Gaonkar, *Microprocessor, Architecture, Programming, and Applications with the 8085*, Penram International Publication.

List of Practical Assignment:

During the learning of course, students need to do assignments:

- a. To Implement various gates using universal NAND/NOR IC's.
- b. To Design and Implement various combinational circuits using gate IC's.
- c. To Design and Implement various combinational circuits using Mux, D Mux, Encoder, Decoder IC's. To learn and analyze different Flip-Flops.
- d. To Design and Implement various sequential circuits using Flip-Flop.
- e. To learn and analyse Counter IC's.
- f. To Design and Implement various sequential circuits.
- g. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
- h. Learn to use ADC and DAC IC's for data conversion.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester III					
Subject Code & Name	Instructions Hours per Week			Marks					
2IT405 Digital Computer Organization	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: Familiarize with the internal working of modern computer systems

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Computer Structure Overview, Addressing Methods & Program Sequencing: Overview, Operational Concepts, Von-Neuman model, Bus Structures, Software, Performance, Addressing Methods – Memory locations, ~~Addresses & Encoding of Information~~, Main Memory Operations. Instruction Sequencing – Straight line Sequencing, Branching. Addressing Modes, Basic I/O Operations, Stack and Queues, Subroutines etc.

Unit-II

The Processing Unit: Processor Organization, Operational Concepts, Instruction Execution, Hardwired Control, Microprogram Control- Microinstructions, Microprogram Sequencing etc. Performance Considerations etc.

Unit-III

Input-Output Organization: I/O Device Access Methods, Interrupt Handling, Device Handling, Exception Handling, Direct Memory Access, I/O Hardware – Processor Bus, ~~Interface circuit~~ etc. I/O Interfaces – SCSI Bus etc .

Unit-IV

Memory System: Introduction, Types of Memory - RAM, ROM etc. Operational Concepts, Cache Memory - Mapping, Replacement Algorithms, Types. Performance Considerations etc.

Unit-V

Arithmetic Operations and Pipelining: Number Representation, Addition, Multiplication of Positive Numbers, Signed-Operand Addition and Multiplication, Adder Design, Floating-Point Numbers- Arithmetic Operations, Implementation etc. Pipelining – Introduction, Operational Concepts, ~~Data~~ Dependency etc.

BOOKS RECOMMENDED

- [1] V. Hamacher, S. Zaky, *Computer Organization*, Mcgraw Hill International, Fifth Edition.
- [2] William Stallings, *Computer Organization and Architecture*, Prentice Hall of India, Sixth Edition.
- [3] A. Tannenbaum, *Structured Computer Organization*, Pearson Education, 2002.
- [4] Patterson & Hennessy, *Computer Organization and Design*, Morgan Kaufmann,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3G1 Computer Organization & Architecture	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide a framework for understanding the fundamentals of computing.
- To familiarize students with relationship between hardware and software to focus on the concepts that are the basis for current computers.
- Develop skills to understand how to design a computer.
- Develop ability to understand how to enhance performance of a computer system.

Prerequisites: Knowledge of Digital Electronics and Computer Programming.

COURSE CONTENTS

Unit-I

Introduction: Difference Between Computer Organization and Computer Architecture, Computer Types, **Flynn's Classification**, Functional Units, Basic Operational Concepts: Bus Structures, Software; Performance: Processor Clock, Basic Performance Equation, Clock Rate, Compiler, **Performance Measurement**; Multiprocessors and Multicomputers, Historical Perspective: Generation of computer, Evolution of Performance; Arithmetic for Computers: Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Booth Algorithm, Floating Point Arithmetic: Addition and Multiplication.

Unit-II

Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory; Memory Speed, Size and Cost Considerations; Cache Memories: Mapping Functions, Replacement Algorithms, Performance Considerations, Hit Rate and Miss Penalty, **Caches on the Processor Chip**; **Virtual Memories: Address Translation; Memory Management Requirements.**

Unit-III

Processing Unit: Addressing Modes, Connections between the Processor and the Memory, Processor Activity, Instruction cycle, John Von Neumann Architecture, **State Machine Concept**, Processor as a State Machine, Data Path Architecture, Data Path Controller: Microprogrammed; Hardwired Design, Firmware Design, Microcontroller Design, **Design of Flip-Flop to understand the Design of CPU.**

Unit-IV

Input Output Organization: I/O Devices: Introduction, Typical Collection, Diversity; Dependability, Reliability, Availability, Disk Storage, Flash Storage, Connecting Processor Memory and I/O Devices, Connection Basics, Interfacing I/O Devices to the Processor Memory and Operating System: Giving Commands to I/O Devices, Communicating with the Processor, Interrupt Priority Levels, Transferring the Data between a Device and Memory, Direct Memory Access and the Memory System; I/O Performance Measures, Impact of I/O on System Performance.

Unit-V

Pipelining & Multiprocessors: Principles of Pipelining, Principles of Linear Pipelining, Clock Period, Speedup, Efficiency, Throughput, Classification of Pipeline Processor, General Pipelines and Reservation Tables, Collision Vector, State Diagram for a Pipeline, Pipeline Hazards, Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors, Introduction to Graphics Processing Units, Introduction to Multiprocessor Network Topologies.

Learning Outcomes:

Upon completing the course, students will be able to:

- Acquire advance knowledge and understanding of computing.
- Use skills in computer design.
- Apply acquired knowledge to improve performance of a computer.
- In addition to development in technology student will be able to innovate in the architecture of computers, such as the use of caches and pipelining.

Books Recommended:

1. Computer Organization, 5th Ed., C. Hamacher, Z. Vranesic, S. Zaky, McGraw Hill International Edition 2002.
2. Computer Organization and Design, 5th Ed. ,David A. Patterson, John L. Hennessy, The hardware/software interface, Morgan Kaufmann Publisher, 2014.
3. Patterson & Hennessy, Computer Organization and Design, Morgan Kaufmann Publisher, 2007.
4. Computer Architecture and Parallel Processing, Kai Hwang, Faye A. Briggs, McGraw Hill Education, 2012.

List of Assignments (Theory):

During the learning of course, students need to do assignments:

1. Performance measurement of a Computer.
2. Arithmetic for Computers.
3. Cache Hit Rate/Miss Penalty issues.
4. Virtual Memory: Address Translation.
5. Use of Addressing Modes.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester III						
Subject Code & Name		Instructions Hours per Week		Marks						
2IT403 Business Data Processing		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objectives: Learn the fundamentals of analysis, design and implementation of Business Information Systems.

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Business Organization: Introduction & Concepts: Business organization fundamentals; Organization as a system; Business requirements and goals; Management functions; MIS; e-Business; System boundary and interface; Communications and network concepts; Business transactions; Data, Information & Knowledge; Transaction processing – batch, online and real time applications.

Unit-II

COBOL Programming: Elements of COBOL Programming; Data Definition; COBOL Program layout; Problem solving, Arithmetic and Logical operations; Algorithm development – flow chart, decision tables, stored program logic.

Unit-III

File Concepts and Programming: Elementary and group items; Various levels for variables declarations; Records, Arrays and Table manipulation; Master file and transaction files; Screen section/report writer features of COBOL; Page formatting; Data management functions, storage/retrieval of data RENAME, REDEFINE, PERFORM statements.

Sequential files – matching of two or more sequential files; File Updation; SORT, MERGE, SEARCH statements; Operations and organizations of direct access files such as indexed access, relative access.

Unit-IV

Systems Analysis & Design Concepts: Introduction; Roles of the Systems Analyst; The Systems Development Life Cycle; CASE Tools; Object-Oriented Systems Analysis and Design; Need for Structured Analysis & Design; Alternative Methodologies

Unit-V

System Modeling Techniques : Introduction to system, process & data modeling; Importance & use of ER diagrams; Data flow diagrams modeling of data dictionary, decision table, decision tree, structured English etc. An overview of UML.

BOOKS RECOMMENDED

[1] N Stern, R A Stern & J P Ley, *Structured COBOL Programming for 21st Century*, 11/e, Wiley Publications, 2005.

[2] J L Whitten, L D Bentley, K C Dittman, *Systems Analysis & Design Methods*, 6/e, Tata McGraw Hill, 2004.

[3] Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, *Systems Analysis and Design*, 3/e, Wiley Publications, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E.(Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR3L1	L	T	P	L	T	P	Total
Computer Hardware Lab	0	0	2	0	0	1	1

Learning Objectives:

To provide the knowledge of computer Hardware parts and latest technology.

- To give basic Knowledge of working internal part of system.
- To develop skill to analyze and find the fault in System.
- To know how to assembling the hardware parts.

Pre requisites: Not Required.

COURSE CONTENTS

UNIT-I

CPC Processor: Basics of Processor and Computer Generation, Study of Different Processor, Pentium, Dual Core , Quad Core , I3, I5, I7 Processor, Motherboards, Chipset and Controllers, BIOS and the Boot Process.

UNIT-II

Internal Components: IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives,SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Internal Ports, Cables and Connector Types, SMPS.

UNIT-III

Computer Peripherals: Monitors:- CRT, LCD and LED Displays, Printers:- Dot-Matrix Printer, Inkjet Printer, Laser Printer Scanner:- Photo Scanner, Documents Scanner, Bar Cord Scanner, Keyboards, Mouse, External Modem, Ports and Connectors, Batteries, Pen Drives, SCSI interface devices, Laptop Computers, Digital Advance storage technology.

UNIT-IV

Memory and Networking Devices: Computer memory: Primary Memory- RAM, ROM, Secondary memory, Switches, Routers, Modems.

UNIT-V

Assembling and Operating System Installation: Assembled the Hardware Parts, Different types of Operating systems, System files FAT and NTFS,Dos , Windows XP, Windows Vista, Windows 7 and Windows 8 and Red Hat Linux and Multi Boot Operating System and latest OS.

Learning Outcomes:

Upon Completing the Course, Student will able to: learn the knowledge of hardware parts and Assemble a computer System and Installation & Uninstallation of Software.

BOOKS RECOMMENDED:

[1] PC AND CLONES Hardware, Troubleshooting and Maintenance B. Govinda rajalu, Tata Mc-graw-Hill Publication

[2] PC Troubleshooting and Repair Stephen J. Bigelow Dream tech Press, New Delhi.

[3] Windows XP Professional and Windows 7 Edition By BPB Publication.

[4] Red Hat Linux By BPB & SYBEX publication.

List of Practical Assignment:

1. To study motherboard.
2. Study of Processor.
3. To study SMPS and UPS.
4. To study the CD-ROM and DVD-ROM.
5. To study working of keyboard and mouse.
6. To study different ports and slots.
7. To study various types of Cables & Connectors.
8. Study of monitor.
9. To study different types of printers.
10. To Run All Dos Command (Internal and External Dos Command)
11. To study Floppy Disk Drive.
12. Installation of different Operating Systems
13. Installation of different device drivers
14. Installation of different Application Software
15. Assembling and Disassembling of a Computer System.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Technology)				
Subject Code & Name	Instructions Hours per Week			Credits			
SIR3S3 Life Management Skills	L	T	P	L	T	P	Total
Duration of Theory Paper:3 Hours	2	-	-	2	-	-	2

Learning Objectives:

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Understanding Self: Evolution and us, Basics of brain-structure, Our feel-good and feel-bad brain-chemicals, Role of genes, Understanding how brain stores information. Understanding emotions, Basics of nervous system, dealing with anxiety, Ways to offset depression, Managing anger, and Right attitude towards competition. Understanding hormones and dealing with hormonal changes, Understanding and managing mood-fluctuations, Understanding the reasons behind OCD and addictions.

Unit-II

Managing Habits: Neurology of habits, developing discipline, creating new habits, Science behind will-power, changing destructive habits, Habits of highly effective people. How to relax, How meditation works, How to bring positivity in oneself, How to bring equanimity in oneself, Happiness – a state of mind, related techniques.

Unit-III

Relationship Management: Ability to size-up situations, Interconnections between emotions and nonverbal behavior, Observing nonverbal behavior, profiling people's personal environments. Roots of empathy, Basics of interpersonal communication, Understanding the types of people & their motivating-factors, Listening skills, Dealing with difficult people.

Unit-IV

Stress Management: Understanding the physiology of stress, Understanding how stress affects learning, How oversensitivity harms, How to focus, Concepts of crisis management, techniques of stress management. Dealing with peer pressure and complexes, Assertiveness Training, Avoiding groupthink, Dealing with distractions, Concepts of healthy relationships.

Unit-V

Wellness Basics: How sleep affects mind, Exercising and mind, Concepts of balanced diet, Importance of recreational habits, Role of art in wellness, How imagination shapes our brain. (more contents can be added in this unit to make it complete)

Text book and other reading resources

Learning Outcomes:

Upon completing the course, students will be able to:

BOOKS RECOMMENDED:

Devi Ahilya University, Indore, Institute of Engineering & Technology				BE II Year (Information Technology) Semester III					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
2AM401 Applied Mathematics-III	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: The course aims at making the students familiar about Special Mathematical Functions and basic Numerical Methods helpful in solving problem of Engineering and Science.

Prerequisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and differential equation.

COURSE OF CONTENTS

Unit-I

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton- Raphson method, Direct iterative method, ~~Giraffe's root squaring method~~. Solution of system of linear algebraic equation: ~~Matrix inversion method, Gauss-elimination Method, Jordan's method, Crout's method~~. Gauss-Seidel and Gauss Jacobi's iterative method.

Unit-II

Difference equation: ~~Definition of difference equations, formation of difference equation. Solution of difference equations: Solution of Homogeneous and non-homogeneous difference equation with constant and variable coefficients using Boole's operator method and generating functions. Simultaneous difference equation.~~

Unit-III

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals. Divided differences and central differences. Numerical differentiation and integration: Differentiation using forward, backward and divided difference General quadrature formula, Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule, Simpson's $3/8^{\text{th}}$ rule, Weddle's rule.

Unit-IV

Numerical solution of I order ordinary differential equation: solution by Euler's, method Euler' Modified method ~~Taylor's series. Picard's successive approximation~~, Runga-kutta method. ~~Milne's Predictors and Correctors method~~. Differential equation of second order: Numerov's methods.

Unit-V

Series solution of ordinary differential equations: ~~Method of Frobenius. Series solution of Bessel and Legendre's differential equations. Special function: Bessel's functions and Legendre's polynomials. Their recurrence relations, generating functions and orthogonal properties, Beta and Gamma Function.~~

BOOKS RECOMMENDED

- [1] Francis J. Scheid, Schaum's *Outline of Numerical Analysis*, McGraw-Hill, New York, 1989.
- [2] Gupta P.P.& Malik G.S., *Calculus of Finite Differences and Numerical Analysis*, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [3] B.S.Grewal, *Engineering Mathematics*, Khanna Publishers, 12/e, 2006.
- [4] S. S. Sastry, *Engineering Mathematics*, Vol I, II Prentice Hall Publication, 3/e, 2004.
- [5] C.Ray Wylie & Louis C. Barretle, *Advanced Engineering Mathematics*, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
AIR4C1: Numerical and Optimization Techniques	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.
- The optimization techniques makes the students aware of the various techniques, which provides an analytical and objective basis for decisions.

Prerequisites: Basic knowledge of determinants, matrices, differentiation and integration of functions, vector algebra, and probability theory.

UNIT-I

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation: Gauss-Seidel, Gauss Jacobi's and relaxation methods.

Numerical solution of I order ordinary differential equation: solution by Euler's and Runge's methods.

UNIT-II

Interpolation: Finite difference operators, Newton's and central difference interpolation formulae, divided differences, Lagrange's interpolation. Numerical differentiation using newton's formulae, maxima and minima. Numerical integration- General quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.

UNIT-III

Linear Programming: Formulation of LP problem, solution by graphical, simplex, big M and two phase methods, duality and dual simplex method, degeneracy and sensitivity analysis.

UNIT-IV

Assignment models: Definition, mathematical formulation, balanced and unbalanced assignment problems, Hungarian method of solution.

Transportation Problems: Definition, mathematical formulation, balanced and unbalanced transportation problems, degeneracy and its resolution.

UNIT-V

Game Theory: Definitions and terminologies of Matrix game theory, Fundamental theorem of matrix games theory, game with mixed strategies and principle of Dominance.

Dynamic programming- Characteristics, dynamic programming approach of solving LPP, optimal subdivision problem, dynamic programming under certainty.

Learning Outcomes:

Upon completing the course, students will be able to:

- Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.
- Use optimization techniques to provide a mathematical model to represent complex functional relationships.

Books Recommended:

1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
3. Hillier, F. S., Lieberman, G. J. – Introduction to Operation Research, 8th Ed., New York, McGraw- Hill, 2005.
4. Taha, H. A. – Operations Research: An Introduction, 7th ed., Macmillan Publication Co.,2003.
5. P K Gupta, D S Hira, Operations Research, S. Chand., 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)						
Subject Code & Name		Instructions Hours per Week			Marks					
3IT402 Operating System		L	T	P		TH	CW	SW	PR	Total
		4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3Hours					Min	35	25	25	25	110

Objective: To study Operating System concepts and its design issues.

Prerequisite: Computer Organization.

COURSE OF CONTENT

Unit I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design,

Unit II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

Unit III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Interprocess communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance.

Unit IV

Memory Management: Swapping, Segmentation, Paging and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

Unit V

I/O management and other issues : ~~Kernel, I/O hardware, I/O interfacing, I/O requesting and interrupts.~~ Disk management: Disk Structure and Scheduling. Protection and Security. ~~Linux: Kernel Organization, Process and resource management, Memory management, Introduction to Linux File System.~~ Overview of Windows Operating System design.

Books recommended:

- [1]. Silberschatz, Galvin and Gagne, **Operating System Principles**, 7th Ed. Addison Wesley.
- [2]. Gary Nutt, **Operating Systems**, 3rd Ed. Pearson Education, India [3]. Tanenbaum, **Modern Operating Systems**, PHI.
- [4]. W. Stalling, **Operating Systems**, Macmillan.

[5]. H. M. Dietel, **Operating Systems**, Addison Wesley Longman.

[6]. Maurice J. Bach, **The design of Unix Operating system**, Pearson Education, India.

[7]. Sumitabha Das, **Unix Concepts & Applications: includes SCO Unix & Linux**, Tata McGraw Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Tech.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR4C2 Operating System	3	1	2	3	1	1	5
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

- Students will learn how Operating System is Important for Computer System.
- To make aware of different types of Operating System and their services.
- To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- To know virtual memory concepts.
- To learn secondary memory management.

Pre requisites: Basic knowledge of Data Structures and Computer Organization.

COURSE CONTENTS

UNIT-I

Introduction: Role of OS: Types of OS, Batch Systems; Multiprogramming; Time Sharing; Distributed & Real time OS. Computer structure and OS: System Architecture – I/O, Storage, Processors; System components- OS Services, System Calls , System Programs; System Design, Implementation and Generation.

UNIT-II

Process Management: Concepts of process: Process status, Process description, Process model. Process Scheduling: Concepts, Scheduler organization, preemptive and non- preemptive scheduler strategies, scheduling algorithms: FCFS, SJN, Priority Scheduling, Round Robin Scheduling, Multiple Processor scheduling, Thread Concepts and Multiple threaded OS.

UNIT-III

Process Synchronization and Deadlock: Process Co-operation, Concepts of Inter-process communication, Process Synchronization, Synchronization Issues, Critical Section problem, Mutual exclusion Primitives and Algorithms, Process Synchronization with semaphores. Concepts of Deadlock, Conditions for Deadlocks, Resource Concepts & Abstractions, Deadlock Prevention, Avoidance and Recovery, Banker Algorithms for Deadlock Avoidance

UNIT-IV

Memory Management and File system: Swapping, Paging, Segmentation and Contiguous memory allocation. Virtual Memory: Demand Paging, Page replacement and Frame Allocation policies, Thrashing. File System: Concepts, Access Method, Directory Structure, and File System Management.

UNIT-V

Disk management and other issues: Disk management: Disk Structure and Scheduling. File systems, and operating system support for distributed systems. Protection and Security related issues. Case studies of contemporary operating systems.

Learning Outcomes:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

BOOKS RECOMMENDED:

- [1]. Silberschatz, Galvin and Gagne, Operating System Principles, 7th Ed. Addison Wesley. [2]. Gary Nutt, Operating Systems, 3rd Ed. Pearson Education, India [3]. Tanenbaum, Modern Operating Systems, PHI.
[4]. W. Stalling, Operating Systems, Macmillan.
[5]. H. M. Dietel, Operating Systems, Addison Wesley Longman.
[6]. Maurice J. Bach, The design of Unix Operating system, Pearson Education, India.
[7]. Sumitabha Das, Unix Concepts & Applications: includes SCO UNIX & Linux, Tata McGraw Hill.

List of Practical:

- Experiments to understand operating system (Ubuntu) installation process, file system partitioning and dual boot setup.
- Experiment to learn command line interface (shell) and exploring various commands of UNIX.
- Writing programs to create and execute shell script.
- Program to implement various algorithms for process scheduling.
- Program to implement various algorithms for page replacement activity in memory management.
- Writing programs to use inter process communication constructs (File sockets/ Shared memory).

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT405 Software Engineering	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective: To familiarize with the process of software development life cycle using the concepts of software engineering.

Prerequisite: Knowledge of a programming language, preferably object oriented and a midsize project work.

COURSE OF CONTENT

Unit I

Software Engineering process- Basic concepts of System Design; Software life cycle; role of Software Engineer; Application Domains. ~~Software Qualities and nature requirements and Measurement. Technique; other Software Engineering issues like formality, modularity, abstraction, reuse, generality etc.~~

Unit II

Software Design Modularity Design, object-orientation; concurrent software specification. ~~Case Styles Operational, Descriptive Logic and Algebraic specification; End user requirements.~~

Unit III

Verification goods and Requirement – Testing, Debugging Analysis, Analysis software Metrics case strides.

Unit IV

Software Engineering Process-Different Models; Process Organization; ~~Case Studies Software Engineering, Management planning control, Organization and Risk Management.~~

Unit V

~~Software Engineering Tools— System programs, Role of Programming languages; CASE Tools; Objected Oriented software Engineering; format Methods; Reengineering process ,Client Server Software Engineering.~~

Book Recommended:

- [1]. C.Gezzi, M. Jazayeri and D. Mandriohi Fundament of software Engineering, PHI 1996.
- [2]. R.S. Pressman, software Engineering A Practitioner Approach, 4/e McgrawHill International Edition 1997.
- [3]. P.Jalote, An Integrated Approach to Software Engineering, Naresa Publishing, Latest Edition.
- [4]. Ian Sommerville, Software Engineering, Pearson education , 7 th edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR4C3 Software Engineering	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To Understand the Software Engineering Practice & Process Models.
- Familiarize students with different software life cycle models.
- Understand the importance of the software development process.
- Understand the importance of modelling and modelling languages.
- Design and develop correct and robust software products.

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Software Engineering process: Basic concepts of System Design, Software life cycle, Software process models: Linear Sequential model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, **Component Assembly Model, RUP and Agile processes, CMM.**

UNIT-II

Requirement Analysis and Specification: Function and Non-functional requirements. Requirement Sources and Elicitation Techniques, Initiating the Requirements Engineering Process, Eliciting Requirements, Developing Use Cases building the Analysis Model, Negotiating Requirements, Validating Requirements.

UNIT-III

Software Design: Overview of System Design, Decomposing the system, System Design Concepts, System Design Activities, Addressing Design Goals, Managing System Design, Design for Web Apps, Design Issues for Web Engineering, Web E Design Pyramid, Interface Design, Architecture Design – Navigation Design – Component Level Design

UNIT-IV

Testing: Testing Strategies, Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Object Oriented Software, Validation Testing, System Testing, The Art of Debugging, Software quality Assurance, Software Reliability, safety critical software development process.

UNIT-V

Software Maintenance: Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering, Project Metrics

Learning Outcomes:

Upon completing the course, students will be able to:

- A clear understanding of Software Engineering concepts.
- Knowledge gained of Analysis and System Design concepts.
- Ability to manage change during development.
- Basic idea of the SOA and AOP concepts

BOOKS RECOMMENDED:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw – Hill, Sixth Edition
2. Ian Sommerville "Software Engineering", Pearson Edu, 9th edition, 2010.
3. Hans Van Vliet, "Software Engineering: Principles and Practices", 2008.
4. Richard Fairley, "Software Engineering Concepts", 2008

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Prepare SRS for email or window explorer domain problem.
2. Using COCOMO model estimate effort for email or window explorer domain problem.
3. Draw E-R diagram, DFD for the project problem of your choice.
4. Draw Use Case diagram for facebook.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT404 Database Management System	L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper:3 Hours	4	0	2	Max	100	50	50	50	250
				Min	35	25	25	25	110

Objective: To gain the knowledge of Database Management System design and familiarize with database application development.

Prerequisite: Data Structures.

COURSE OF CONTENT

Unit I

Introduction to DBMS: Database Environment: Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit II

Database Analysis: Introduction to Data Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs-Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues

Unit III

Database Design: Introduction to Logical Database Design, Relational Data Model – Codd’s Rules, Relational Algebra etc. ;Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc.

Unit IV

System Implementation: Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs - Views, Triggers, Cursors etc; Transaction Processing – Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking and Time Stamping Issues etc.

Unit V

Advance Topics: Physical Database Design – File Organization and Indexes, Hashing Techniques, B-trees, B+ Trees etc; Database Recovery, Database Security, Introduction to Data Warehousing and Data Mining, Emerging Database Technologies and Applications etc., Overview of Oracle 10i.

Books Recommended:

- [1]. Fundamentals of Database Systems – Elmasri ,Navathe, Addison Wesley.
- [2]. Modern DataBase Management – Macfadden,Hoffer,Prescott ,Pearson Education Asia.
- [3]. Database System Concepts – Silberchatz, Korth and Sudarshan, Mcgraw Hill, Fourth Edition
- [4]. An Introduction to Database Systems, C.J. Date, Addison Wesley.
- [5]. Database Systems, Connolly and Begg, Pearson Education.
- [6]. Teach Yourself SQL & PL/SQL, Ivan Bayross BPB Publication.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Technology) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR4C4 DATABASE MANAGEMENT SYSTEMS	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

4. To understand the need of databases, its architecture and schemas.
5. To familiarize students with representing domains using entity-relationship modelling.
6. How to design a normalized schema in the relational data model.
7. Develop skills in students to implement schema and query using SQL.
8. Develop ability to develop database applications based on the requirements.

Prerequisites: Knowledge of Data Structures and Computer Programming and some topics of operating systems.

COURSE CONTENTS

Unit-I

Introduction: Database Environment: Basic Concepts, Advantages of Database approach, Comparison with Traditional file systems, DBMS Architecture, Database Users, Data Models and Schemas, Database languages and Interfaces; Database development process: Development Lifecycle, Types of Application.

Unit-II

Database Analysis & Modeling: Introduction to Data Analysis and Modeling, Modeling the rules, Entity Relationship Model, ER Model Constructs- Attributes, Relationship etc., Enhanced ER Model and Business Rules, Modeling Enhanced relationships – Specialization and Generalization, Union Types. Binary and Ternary relationship Issues.

Unit-III

Database Design: Introduction to Logical Database Design, Relational Data Model – Codd's Rules, Relational Algebra etc.; Integrity Constraints, Transforming ER diagrams into relations, Functional Dependencies, Normalization – 1NF, 2NF, 3NF, BCNF and 4NF etc..

Unit-IV

System Implementation & Transaction Processing: Introduction to SQL – Inserting , Updating, and Deleting data, Processing Single Tables, Processing Multiple Tables, PL/SQL Constructs - Views, Triggers, Cursors etc; Transaction Processing – Properties, Schedules and Serializability Issues. Concurrency Control – Introduction, Locking etc.

Unit-V

Advance Topics: File Organization and Indexes, Hashing Techniques, B-trees, B+ Trees etc; Database Recovery, Database Security, Introduction to Data Warehousing and Data Mining, Emerging Database Technologies and Applications etc., **Overview of MySQL.**

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand the fundamentals of relational database system including: data models, database architectures and database manipulations.
- Understand the theories and techniques in developing database applications and be able to demonstrate the ability to build databases using DBMS such as MySQL.
- Be familiar with managing database systems
- Understand new developments and trends in databases.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
3. A First Course in Database Systems, By J. Ullman, J. Widom, 3rd Edition, Pearson Education, 2014.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.
5. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
6. MySQL : The Complete Reference, 1st Edition, McGraw Hill Education, 2004.

List of Assignments:

During the learning of course, students need to do assignments:

12. Designing an E-R model.
13. Solving basic SQL assignments.
14. Solving intermediate SQL assignments involving Nested and Join queries.
15. Using PL/SQL constructs involving procedures, triggers, views etc.
16. Exploring how transaction processing is handled by MySQL.
17. Minor Project on developing a database application.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ET455 Digital Communication Engineering	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
	Duration of Theory Paper:3 Hours			Min	35	25	25	25	110

Course Objectives:

- To provide an introduction to the basic principles in analog and digital communication.
- To introduce the various processes like sampling, modulation and coding techniques, channel coding techniques etc. that are used in modern telecommunication system.
- To review the basic Fourier techniques and its application in these processes.
- To give exposure to quantitative method of measuring information and determining the capacity of communication system.

Prerequisite(s): Basic exposure to signals and systems.

COURSE OF CONTENTS

UNIT I

Review of Fourier techniques, Fourier techniques for linear system analysis, Fourier transform properties convolution, Error Function and complimentary error function, Introduction to analog modulation techniques like AM, FM, PM.

UNIT II

Line coding: NRZ, RZ, Biphasic, Duo binary etc. their comparison and spectrum associated either their wave forms. Signal and Spectra: classification of signals, spectral density, auto-correlation, random signals, ~~bandwidth of digital data.~~

UNIT III

Sampling and quantization, Digital coding techniques, PCM, DPCM, ADPCM, DM, ADM, Vocoders, ~~optimum filter~~, matched filter. Digital modulation techniques, binary PSK, QPSK, MSK etc., performance analysis and comparison of digital modulation techniques in presence of noise.

UNIT IV

Information theory: concept of amount of information, entropy, information rate, coding to increase average information per bit, Huffman coding, channel capacity, Shannon's theorem of channel capacity.

Channel coding: Linear block codes, systematic Linear blocks codes, parity check matrix, syndrome testing, cyclic codes hamming codes.

UNIT V

Introduction to spread spectrum techniques – spread spectrum overview, ~~pseudo-noise sequence~~, direct sequence spread spectrum system, Frequency hopping system, synchronization, spread spectrum application, CDMA systems.

BOOKS RECOMMENDED:

- [1] Taub & Schilling, “Principals of Communication System”, Tata McGraw Hill publication, Third edition, 2007.
- [2] J.G. Proakis, “Digital Communication”, McGraw Hill publication, Fourth edition, 2001.
- [3] Lathi B.P., “Modern Analog and Digital Communication Systems”, Oxford Univ. Press, Third edition.
- [4] Haykins Simon, “Digital Communication”, Wiley Publication, Third edition, 2007.
- [5] Haykins Simon, “Analog and Digital Communication”, Wiley Publication, Third edition, 2007.
- [6] Bernard Sklar, “Digital communication”, Pearson Education, Second edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Tech.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR4G 2 Digital Communication Engineering	3	1	0	3	1	0	4
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

- To review the basic Fourier techniques and its application in these processes.
- To provide knowledge of basic principles of analog and digital communication.
- To introduce the various processes like sampling, digital coding techniques, modulation and channel coding techniques that are used in modern telecommunication system.
- To give exposure to quantitative method of measuring information and determining the capacity of communication system.
- To provide knowledge of spread spectrum techniques.

Pre requisites: Basic exposure to signals and systems.

COURSE CONTENTS

UNIT-I

Review of Fourier techniques, Fourier techniques for linear system analysis, Fourier Transform properties convolution, Error Function and complimentary error function, Introduction to analog modulation techniques like AM, FM, PM.

UNIT-II

Line coding: NRZ, RZ, Biphasic, Duo binary etc. their comparison and spectrum associated with their wave forms, bandwidth of digital data. Signal and Spectra: classification of signals, Parseval's theorem, energy spectral density, power spectral density, auto-correlation, crosscorrelation, random variables.

UNIT-III

Sampling and quantization, Digital coding techniques, PCM, DPCM, ADPCM, DM, ADM, vocoders, matched filter. Digital modulation techniques, BPSK, QPSK, MSK, performance analysis and comparison of digital modulation techniques in presence of noise.

UNIT-IV

Information theory: concept of amount of information, entropy, information rate, coding to increase average information per bit, Huffman coding, channel capacity, Shannon's theorem of channel capacity. Channel coding: Linear block codes, systematic Linear blocks codes, parity check matrix, syndrome testing, cyclic codes, hamming codes.

UNIT-V

Introduction to spread spectrum techniques – spread spectrum overview, spreading sequences, properties of spreading sequences, spreading gain, direct sequence spread spectrum system, jamming margin, frequency hopping system, spread spectrum applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand frequency domain analysis and its importance.
- Understand about the digital data transmission using line coding.
- Understand the working of transmitter and receiver in digital communication system.
- Understand how to detect and correct the errors introduced during the transmission.
- Understand basics of secured communication using spread spectrum techniques.

BOOKS RECOMMENDED:

1. Lathi B.P., “Modern Analog and Digital Communication Systems”, Oxford Univ. Press, Third edition.
2. Taub & Schilling, “Principals of Communication System”, Tata McGraw Hill publication, Fourth edition, 2007.
3. J.G. Proakis, “Digital Communication”, McGraw Hill publication, Fourth edition, 2001.
4. Haykins Simon, “Digital Communication”, Wiley Publication, Third edition, 2007.
5. Haykins Simon, “Analog and Digital Communication”, Wiley Publication, Third edition, 2007.
6. Bernard Sklar, “Digital communication”, Pearson Education, Second edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE II Year (Information Technology)						
Subject Code & Name	Instructions Hours per Week		Marks					
2SS07-Effective Communication Skills	L	T		TH	CW	SW	PR	Total
	2	0	Max	-	50	-	-	50
	Duration of Theory Paper:3 Hours		Min	-	25	-	-	25

Course Objectives: To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

Prerequisite(s): Technical English

COURSE OF CONTENTS

Unit-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Why Communication is necessary?; ~~Art of Communication.~~

Unit-II

Inter-personal skills: ~~Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts; Telephone speaking skills and Cross-cultural communication skills~~

Unit-III

Listening- ~~The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.~~

Unit-IV

Interviews: ~~Points to be remembered as an interviewer or an interviewee; Commonly asked questions; Types of interviews; Do's and Don'ts.~~

Unit-V

Making Presentations: ~~Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Non-verbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.~~

BOOKS RECOMMENDED

[1] P D Chaturvedi, P.D. & M Chaturvedi, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.

[2] ICMR, *Business Communication*, Feb 2001.

[3] J Davies, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education, 2006.

Lecture material given by the course teacher.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Information Tech.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SIR4S4S Communication Skills	3	1	-	3	1	-	4
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

- introduced to skills involved in making a presentation at a conference.
- To help students acquire the basics of interpersonal skills and public speaking.
- To improve their communication skills and ability to understand others
- To develop skills involved in making a presentation at a conference.
To develop understanding about Dressing Sense, Telephone and Mobile Etiquettes.

COURSE CONTENTS

UNIT-I

Introduction to Communication: Purpose of Communication; Process of Communication; Importance of Communication in Business; Differences between Technical and General Communication; Barriers to Communication; Measures to Overcome the Barriers to Communication. Objectives and Principles of Communication.

UNIT-II

Types of Communication & Listening Skills: Types of Communication; Verbal Communication-Importance of verbal communication- Advantages of verbal communication, Significance of Non-verbal Communication. Listening Process: Classification of Listening, Purpose of Listening, Common Barriers to the Listening Process, Measures to Improve Listening. Listening as an Important Skill in Work Place.

UNIT-III

Communication Network: Scope and Types of Communication Network; Formal and Informal Communication Network; Upward Communication; Downward Communication; Horizontal Communication; Diagonal Communication.

UNIT-IV

Oral Communication Skills Attire and Etiquettes: Oral Business Presentation and Public Speaking; Self-Monitoring as tool for Public Speaking; Purpose, Analysis of Audience, Steps in Making a Presentation, Delivering a Presentation. Dressing Sense and Telephone/Mobile Etiquettes.

UNIT-V

Employment Communication Job Interview: Importance and Factors Involving Job Interview; Characteristics of Job Interview; Job Interview Process; Job Interview Techniques-

Manners and etiquettes to be maintained during an interview. **Group Discussion; Purpose, Methods and Importance**

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Analyze different Communication Pattern.
2. Understand Audience while speaking publically.
3. Implement Interview Technique and Group Discussion.
4. Develop understanding toward making own Style of Communication.

Suggested Readings:

1. Pal, R. & Korlahalli, J.S. Essentials of Business Communication, Sultan Chand & Sons, New Delhi.
2. Sethi, J & et al. A Practice Course in English Pronunciation, Prentice Hall of India, New Delhi.
3. Sen, Leena. Communication Skills, Prentice Hall of India, New Delhi.
4. Prasad, P. Communication Skills, S.K. Kataria& Sons.
5. A.S. Hornby's. Oxford Advanced Learners Dictionary of Current English, 7th Edition.
6. Bill Scott, The Skills of Communication, Bombay, Jaico
7. Ronald E. Dulek & John S. Fielden, Principles of Communicatin, New York, McMillan.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester III						
Subject Code & Name		Instructions per Week		Hours		Marks				
2IT403		L	T	P		TH	CW	SW	PR	Total
Business Data Processing		4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours					Min	35	25	25	25	110

Course Objectives: Learn the fundamentals of analysis, design and implementation of Business Information Systems.

Prerequisite(s): Computer Programming

COURSE OF CONTENTS

Unit-I

Business Organization: Introduction & Concepts: Business organization fundamentals; Organization as a system; Business requirements and goals; Management functions; MIS; e-Business; System boundary and interface; Communications and network concepts; Business transactions; Data, Information & Knowledge; Transaction processing- batch, online and real time applications.

Unit-II

COBOL Programming: Elements of COBOL Programming; Data Definition; COBOL Program layout; Problem solving, Arithmetic and Logical operations; Algorithm development- flow chart, decision tables, stored program logic.

Unit-III

File Concepts and Programming: Elementary and group items; Various levels for variables declarations; Records, Arrays and Table manipulation; Master file and transaction files; Screen section/report writer features of COBOL; Page formatting; Data management functions, storage/retrieval of data RENAME, REDEFINE, PERFORM statements. Sequential files- matching of two or more sequential files; File Updation; SORT, MERGE, SEARCH statements; Operations and organizations of direct access files such as indexed access, relative access.

Unit-IV

Systems Analysis & Design Concepts: Introduction; Roles of the Systems Analyst; The Systems Development Life Cycle; CASE Tools; Object-Oriented Systems Analysis and Design; Need for Structured Analysis & Design; Alternative Methodologies

Unit-V

System Modeling Techniques: Introduction to system, process & data modeling; Importance & use of ER diagrams; Data flow diagrams modeling of data dictionary, decision table, decision tree, structured English etc. An overview of UML.

BOOKS RECOMMENDED

[1] N Stern, R A Stern & J P Ley, *Structured COBOL Programming for 21st Century*, 11/e, Wiley Publications, 2005.

[2] J L Whitten, L D Bentley, K C Dittman, *Systems Analysis & Design Methods*, 6/e, Tata McGraw Hill, 2004.

[3] Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, *Systems Analysis and Design*, 3/e, Wiley Publications, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
2ET455 Microprocessor & Assembly Language Programming	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: To provide the fundamentals of microprocessor 8085, its assembly language programming and the concept of Interfacing, peripheral chips.

Prerequisite(s): Knowledge of following concepts is required, Number Systems (binary, octal, and hexadecimal) and their conversions. Boolean algebra, logic gates, flip-flops, and registers. Concepts in combinational and sequential logic.

COURSE OF CONTENTS

Unit-I

Comparison among microprocessor microcontroller and computer. Introduction to 8085 microprocessor: Pin diagram, architecture , programming model , instruction set , classification of instruction set , instruction and data format , timing diagram of instructions. Basic concept of programming

Unit-II

Addressing modes. Counters and time delay. Stack and subroutine. Code conversion, BCD arithmetic , and 16 bit data operation. Programming Techniques. Basic interfacing concept, memory interfacing. Memory mapped and peripheral mapped I/O techniques.

Unit-III

The 8085 Interrupts, Input /output interfacing, interfacing data converters, 8259 interrupt controller.

Unit-IV

Programmable interfacing devices, 8155 multipurpose programmable device, The 8255 programmable peripheral interface, The 8253/8254 programmable interval timer.

Unit-V

8237/8257 DMA controller. 8279 keyboard/display interface. Serial I/O and data communication using RS-232C serial I/O standard. The 8251 (USART) programmable communication interface.

BOOKS RECOMMENDED

- [1] Ramesh S. Gaonkar, *Microprocessor, Architecture, Programming, and Applications with the 8085*, Penram International Publication, 5/e.
- [2] P.K. Ghosh and P. R. Sridhar, *0000 to 8085 Introduction to microprocessor for Engineers and Scientists*, PHI, 2/e
- [3] Douglas v. hall, *Microprocessor and interfacing programming and Hardware*, Tata McGraw Hall, 2/e
- [4] N.K. Srinath , *8085 Microprocessor Programming and Interface*, PHI, 2005.

Devi Ahilya University, Indore, India				BE II Year (Information Technology)					
Institute of Engineering & Technology				Semester III					
Subject Code & Name	Instructions per Week		Hours	Marks					
2SS456	L	T	P		TH	CW	SW	PR	Total
Engineering Economics	2	-	-	Max	-	50	-	-	50
Duration of Theory Paper: Only Internal Tests				Min	-	25	-	-	25

Course Objectives: To make fundamentally strong base for decision making skills by applying the concepts of economics and accounting to cope up with the current dynamic business environment

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Engineering Economics: Economic Decision: Role of Engineering in Business; Concept, Nature and Scope of Economics & Business Economics; Types of Business Organizations. Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-II

National Income: Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-III

Consumer Demand: Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-IV

Production Supply: Production Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-V

Liberalization: Liberalization, Globalization & Privatization: Concept & Characteristics; Evaluation of New Liberal Economic, Policy of India; Economy through Globalization.

BOOKS RECOMMENDED

- [1] C S Park, *Contemporary Engineering Economics*, Pearson Education, 2002
- [2] J S Chandan, *Statistics for Business and Economics*,
- [3] C Dislis, JH Dick, I D Dear & AP Ambler, *Test Economics and Design for Testability*
- [4] S Damodaran, *Managerial Economics*,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT401 Theory of Computation	L	T	P		TH	CW	SW	PR	Total
	4	0	0	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Course Objectives: - To familiarize students about theoretical & mathematical aspects of computer science and making their problem solving thinking stronger.

Prerequisite: Discrete Structures, Applied Mathematics.

Course of Content

UNIT I

Introduction to Formal Languages, Grammar and Automata; Finite State Machines- DFA & NDFAs; Regular Expressions; Properties of Regular Languages; Pumping Lemma.

UNIT II

Chomsky's Hierarchy; Context Free Languages & Grammars; Recognition, Translation and Parsing; Normal Forms of CFG; CKY Algorithm. Pushdown Automata; PDA and CFG; Nondeterministic PDA, Properties of CFLs; Pumping Lemmas;

UNIT III

Turing Machines (TMs)- TM as Language Acceptor, ~~Transducer and Problem Solver~~. Multitape TMs, Nondeterministic TMs, Universal TMs, Turing Computable functions.

UNIT IV

~~Predicate Calculus Syntax and Wffs; Models of Interpretation and Semantics Horn and Ground Clauses; Resolution Techniques.~~

UNIT V

Context-Sensitive grammars and Linear Bounded Automata (LBAs). ~~Petri nets and its Applications. Computational Complexity, Unsolvable problems, Complexity of Computing using HLL programs and Automata models.~~

BOOKS RECOMMENDED:

- [1] D Mandriolli, C Ghezzi, Theoretical Foundation of Computer Science, John Wiley, 1987.
- [2] Zohar Manna, Mathematical Theory of Computation, McGraw Hill, 1977.
- [3] Cohen, Introduction to Computer Theory, John Wiley, 1990.
- [4] Moll, Arbib, Kfoury, Introduction to Formal Language Theory, Springer Verlag, 1990.
- [5] P Linz, An Introduction to Formal languages and Automata, 3/e, Narosa Pub. 2003.
- [6] J. Martin, Introduction to Languages and the Theory of Computation, 3/e, Tata McGraw Hill, 2005.
- [7] J.Hopcroft and J.D. Ullman. "Introduction to Languages, Automata and Computation Addition Wesley, 1981.
- [8] Lewis and Papadimitrou, "Element of Theory of Computation," Printice Hall, 1981.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Information Tech.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR5C1 Theory of Computation	3	1	0	3	1	0	4
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

- To provide a formal connection between algorithmic problem solving and the theory of languages and automata and develop them into a mathematical (abstract) view towards algorithmic design and in general computation itself.
- The course should in addition clarify the practical view towards the applications of these ideas in the engineering part as well.

Prerequisite:

Students should have a background in discrete mathematics, data structures, and programming languages.

COURSE CONTENTS

UNIT-I

Finite Automata and Regular Languages: Motivation for studying theory of computation, Notion of formal languages and grammars, Kleene's Closure, Regular Expressions and Regular languages, closure properties of regular languages, Finite Automata. Finite Automata with output: Mealy and Moore machines, applications.

UNIT-II

Nondeterminism and Minimization: Nondeterministic Finite Automata, Acceptance condition. Kleene's Theorem, Myhill-Nerode relations, Minimization Algorithm, Non-Regular languages, Pumping Lemma for regular languages.

UNIT-III

Grammars and Context-Free Languages: Grammars and Chomsky Hierarchy, Context-Free Grammars, Context-Free Languages (CFLs), Inherent Ambiguity of CFLs, closure properties of CFLs, Eliminating useless symbols; null-productions; and unit productions, Chomsky Normal Form, Greibach Normal Form, Cock-Younger-Kasami (CYK) Algorithm, Applications to Parsing.

UNIT-IV

Pushdown Automata: Pushdown Automata (PDAs), PDAs vs CFLs. Deterministic PDAs and CFLs, applications, notion of acceptance for PDAs: acceptance by final states, and by empty stack; the equivalence of the two notions, Proof that CFGs generate the same class of languages that PDAs accept, Pumping Lemma for CFLs.

UNIT-V

Turing Machines and Computability: Introduction to Turing Machines, Configurations, Halting vs Looping, Turing computability, Nondeterministic, multitape and other versions of Turing machines. Church's thesis, Universal Turing Machines, Linear Bounded Automata (LBAs) and context-sensitive languages, Recursive and Recursively enumerable languages, Undecidability of Halting Problem and unsolvable problems about Turing Machines, the diagonalization language and proof that it is not Recursively enumerable.

Learning Outcomes:

After completing the course, the student will be able to:

1. Model, compare and analyse different computational models.
2. Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
3. Identify limitations of some computational models and possible methods of proving them.
4. Have an overview of how the theoretical study in this course is applicable to and engineering application like designing the compilers.
5. Have an understanding of the solvable and unsolvable problems and their computational behaviors.

Books Recommended:

1. Daniel I.A. Cohen, Introduction to Computer Theory, John Wiley, 1990
2. John C. Martin, Introduction to Languages and the Theory of Computation, 3/e Tata McGraw Hill, 2005
3. J.E. Hopcroft and J.D.Ullman, Introduction to Automata, Languages and Computation, Narosa Publishing House, 1995
4. J.E. Hopcroft, Rajeev Motwani and J.D.Ullman, Introduction to Automata, Languages and Computation, Pearson Education, Asia, 2002
5. H.R. Lewis and C.H. Papadimitrou, Elements of the Theory of Computation, Prentice Hall Inc., 1999
6. M. Sipser, Introduction to the Theory of Computation, Brooks/Cole Thomson Learning, 1996
7. Zohar Manna, Mathematical Theory of Computation, McGraw Hill, 1997

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technology					
Subject Code & Name	Periods Hours/	Marks	Th	CW	SW	Pr	Total
4IT452 Object Oriented Design	Week	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	Lectures- 4 Tutorials-0 Practical- 2	Min	35	25	25	25	110

Objective: To learn object oriented analysis, modelling and design using UML. To learn object oriented approach of software engineering.

Prerequisite: Knowledge of object oriented programming and basics of software engineering.

Course of Contents

Unit-I

Rational Unified Process, Process Notation, Business Modeling Workflow, ~~Review of Object Orientation, definition of OOA, OOD and OOP~~

Unit -II

Object Oriented Analysis: Requirements Overview, Problem Statement, Glossary, Use-Case Model, Supplementary Specifications, Analysis and Design Overview Architectural Analysis: Analysis Mechanisms, ~~Key Abstractions, Pattern, Frame, Initial Architectural Layers~~, Use Case Analysis: finding classes from use case behavior, describe responsibility, attribute and association, qualify analysis mechanism

Unit – III

~~Architectural Design: Design & Implementation Mechanisms, Design Classes & Subsystems, Reuse opportunities Use Case Design: Interactions between Design Objects, Persistence-Related Behavior, Refine the Flow of Events Description, Unify Classes and Subsystems~~

Unit – IV

~~Subsystem Design: Subsystems and Interfaces, Distribute Subsystem Behavior to Subsystem Elements, Document Subsystem Elements, Subsystem Dependencies Class Design: Create Initial Design Classes, Identify Persistent Classes, Define Operations, Class Visibility, Methods, States, Attributes, Dependencies, Associations, Generalizations, Resolve Use Case Collisions~~

Unit – V

~~Concurrency and Distribution Overview, UML, case study of OOAD application~~

Books Recommended:

1. Grady Booch, Object Oriented Analysis & Design with Application, Pearson Education India 2nd Edition.
2. Scott W. Ambler, The Object Primer, Cambridge University Press, 2nd Edition.
3. Philippe Kruchten, The rational Unified Processes & Introduction Pearson Education India 2nd Edition.
4. Grady Booch, Games Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley
5. M. Blaha, J. Rumbaugh, Object Oriented Modeling and Design with UML, Pearson Education 2nd Edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5C2 Object Oriented Analysis & Design	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To learn object oriented analysis, modeling and design using UML.
- To learn object oriented approach of software engineering.

Prerequisite:

Knowledge of object oriented programming and basics of software engineering.

COURSE CONTENTS

UNIT-I

Rational Unified Process, Process Notation, Introduction to UML, Business Modeling Workflow, Object Oriented Analysis: Requirements Overview, Problem Statement, Glossary, Supplementary Specifications, Analysis and Design Overview; Architectural Analysis overview, Use Case Analysis: finding classes from use case behavior, describe responsibility, attribute and association; qualify analysis mechanism.

UNIT-II

Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT-III

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT-IV

Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-V

Architectural Modeling: Architectural Analysis: Analysis Mechanisms, Key Abstractions, Component, Deployment, Component diagrams and Pattern, Initial Architectural Layers, Deployment diagrams

Learning Outcomes:

After successfully completing this course you will be able to:

1. Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
2. Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language

Books Recommended:

1. Grady Booch, Object Oriented Analysis & Design with Application, Pearson Education India 2nd Edition.
2. Scott W. Ambler, The Object Primer, Cambridge University Press, 2nd Edition.
3. Philippe Kruchten, The rational Unified Processes & Introduction Pearson Education India 2nd Edition.
4. Grady Booch, Games Rumbaugh, Ivar Jacobson, The Unified Modeling Language User Guide, Addison Wesley
5. M. Blaha, J. Rambaugh, Object Oriented Modeling and Design with UML, Pearson Education 2nd Edition,2007.

List of Practical Assignment:

1. To develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT403 Computer Networks	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective: To learn basics of Computer Networks and its design issues.

Prerequisite: Communication System basics.

COURSE OF CONTENT

Unit I

Introduction: Computer Network-Definition, Goals, Design Issues, Network architecture-Broadcast & Point to Point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN,WAN & MAN, protocols & services types of service-connection oriented and connection less, Transmission Media : Twisted pair, Coaxial cable, Fiber optic cable, Wire less transmission, Telephone System, Multiplexing, Switching: Circuit, Packet & Message Switching. Network Devices: Repeater, Bridge, Router, Gateways, NIC, Cabling System.

Unit II

Data Link Layer Design and Protocols: Framing, Error control-Bit Error: causes of error, control methods, Flow control – Stop & Wait, Sliding Window Protocols, MAC Protocols: Aloha, CSMA, CSMA/CD, Collision free protocols, IEEE 802.3 standard, Fast Ethernet, Gigabit Ethernet, Overview of Wireless LANs: IEEE 802.11 standard.

Unit III

Network Layer Design and Protocols: Internetworking: Concepts and Architecture. Routing: different routing algorithms, Congestion Control, Addressing- IP Addressing and subnet masking, ~~CIDR~~, IPv6, IP protocol and other supporting protocols at IP layer: ARP, ~~RARP~~, ICMP.

Unit IV

Transport Layer Design and Protocols: Transport layer addressing, Connection Establishment and release, Buffering, Multiplexing, Crash Recovery, TCP/IP suit of Protocols –TCP & UDP, TCP: Protocol, Segment header, transmission policy.

Unit V

Application Layer and Other Issues: ~~Domain Name System~~, File Transfer Protocol, Telnet, Email: Architecture and services, ~~HTTP~~, NAT, Firewall and Proxy, ~~Network performance issues~~ and QOS, Overview of network security.

Books Recommended:

- [1] Computer Network by A.S. Tanenbaum, 4th Ed Pearson Education,2007
- [2] An Engineering Approach to Computer network by S. Keshav, Pearson Education
- [3] Data and computer communication by William Stalling 5TH Ed PHI, 1996.
- [4] Internetworking with TCP/IP Vol. I by D.E.Comer, 5th Pearson Education
- [5] Data Communication and Networking by Forouzan, 4th Ed Tata McGraw Hills

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5C3 Computer Networks	L	T	P	L	T	P	Total
	3	1	2				
Duration of Theory Paper: 3 Hours				3	1	1	5

Learning Outcomes:

1. Build an understanding of the fundamental concepts of computer networking. □
2. Familiarize the student with the basic taxonomy and terminology of the computer
3. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks. □

Prerequisite: Basic knowledge of programming and Data Structures.

COURSE CONTENTS

UNIT-I

Introduction: Definition and goals, Design issues, Network architecture-broadcast & point to point, Models-OSI reference & TCP/IP and their comparative study, Network classification-LAN, WAN & MAN, protocols & services, types of service-connection oriented and connectionless, different protocols. Transmission Media: Twisted Pair, Coaxial cable, Fiber optic cable, Wireless transmission, telephone system, multiplexing, switching-circuit, packet & message switching, **Virtual circuit switch**. Network devices-repeater, bridge, router, gateways, network interface cards, cabling system.

UNIT-II

Data Link Layer: Framing, Error control-Bit Error, causes of error, control methods, Flow control: Stop & wait, sliding window concept, piggybacking. Local Area Network Technology: Protocols- Aloha, CSMA, CSMA/CD, Collision free protocols, IEEE 802 protocols, **standard-topologies, cabling system, Network management, MAC addressing frame format. Ethernet.**

UNIT-III

Network Layer: Introduction, features & design issues, Routing- different routing algorithms, congestion control, Internetworking- Concepts and architecture. Addressing-IP Addressing and subnet masking, IP protocols, **Network Address Translation**, Address resolution protocol (ARP).

UNIT-IV

Transport Layer: Introduction, design issues, Transport layer addressing, buffering, multiplexing, recovery, TCP/IP suit of protocols- TCP & UDP Network applications, Connection establishment, Connection release, TCP Header.

UNIT-V

Application Layer: Introduction to application layer, Application layer protocols: Electronic mail, File transfer, remot login, WWW, Multimedia etc. Firewalls.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

Independently understand basic computer network technology.

1. Understand and explain Data Communications System and its components.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network
5. Understand and building the skills of subnetting and routing mechanisms.
6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Books Recommended :

1. Comuter Networks, Andrew. S. Tanenbaum, 4/e, Prentice Hall of India Private Ltd, 2003. □
Data Communications and Networking, Behrouz A Forouzan, 4/e, Tata McGraw Hill Education Private Limited. □
2. Data Communications & Networks, Achyut S. Godbole, Tata McGraw Hill Education Private Limited, 2002. □
3. Data and Computer Communication, William Stalling, 7/e, Prentice Hall of India Private Ltd, 2007. □

List of Practical Assignments:

During learning of course, students need to do assignments:

1. Study of various network devices in detail.
2. Study of basic network commands and network configuration commands.
3. Installation of LAN card.
4. Implementation of Bit Stuffing.
5. Implementation of Byte stuffing.
6. Implementation of error correcting codes.
7. Implementation of error detection codes.
8. Study of network IP.
9. Implementation of various routing protocols.
10. Programming with Sockets.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT454 Web Engineering	L	T	P		TH	CW	SW	PR	Total
	4	0	0	Max	100	50			150
Duration of Theory Paper: 3 Hours				Min	35	25			60

Objective: To learn the process of information exchange over Web and related issues.

Prerequisite: Knowledge of HTML and Java programming language (core).

Course of Contents

Unit I

XML Basics : Introduction to Markup languages, What is XML?, Elements & Attributes, Character data, Character & entity references, CDATA sections, Comments, Processing instructions, Document structure, Well formed XML, Valid XML, XML parsers.

Unit II

Document Type Definition and XML Schema: Document Type declaration, Element Type declaration, Attribute type declaration, Attribute Types, Attribute defaults, Entities, Notation Declarations, Limitations of DTD, Namespaces in XML. Why do we need an XML Schema? XML Schema vs DTD, Schema Structure, Simple Types & Complex Types, Element Declaration, Attribute declaration, Local vs global Declarations, Deriving new types & using facets.

Unit III

Transforming XML and XPATH: What is Transformation? Executing Transformations, XSLT for presentation: XML to HTML Example, ~~XSLT for Data conversion: XML to XML example.~~ Introduction to XPATH, XPATH Axes, XPATH Expressions and Location Paths, XPATH Syntax, XPATH Functions.

Unit IV

Document Object Model and Simple API for XML: DOM Implementation, DOM Components, ~~Creating Nodes, Traversing the Nodes.~~ DOM vs SAX, SAX based parsers, Events, Using SAX.

Unit V

Web Services: ~~Distributed Computing Architecture: DCOM, HOP, Java RMI, Web Services, The Web services stack: SOAP, WSDL and UDDI, Service Oriented Architecture, The Three revolutions: Data, Architecture and Software.~~

BOOKS RECOMMENDED:

- [1] David Hunter “ Beginning XML”, Wiley dreamtech, 2005, Third Edition
- [2] Kal Ahmed, Sudhir Ancha “Professional Java XML”, SPD, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Information Technology)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5E1 Web Technology	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: Introduce the students to emerging web technologies. Introduce the students with XML concepts and its application Motivate the students to develop 3 tier web applications. Understanding of server side programming using Java Servlets To create awareness about the MVC

Prerequisite: NIL

COURSE CONTENTS

UNIT-I

Introduction to Web Technology: WWW and Protocols: TCP/IP , HTTP, DNS, SMTP etc. Web Servers (IIS, Apache etc)- Web Browsers, Uniform Resource Locator, HTTP Request and Response Types , n -Tier Architecture, Common Gateway Interface, Introduction to HTML5 (Elements, Attributes, Hyperlinks, Forms, div, Tables, links, images), Designing effective navigation. Cascading Style Sheets- using CSS, background images, colors and properties, using fonts, borders and boxes, margins, positioning, animation and transition effects with CSS3.

UNIT-II

JavaScript and DHTML: JavaScript and variables, functions, conditions, loops and repetition, Pop up boxes,, Event Handling, forms and validations, JavaScript standard objects, DOM, AJAX, Regular Expression XML Technologies: Introduction of XML, Validation of XML documents, DTD, XML for data files, HTML vs XML, Embedding XML into HTML documents, Displaying XML using CSS and XSL, Introduction to JQuery.

UNIT-III

Java Servlets: Difference between CGI & Servlets, Servlet API, HttpServletRequest, HttpServletResponse, ServletConfig, ServletContext Session Management, RequestDispatcher , Filters

UNIT-IV

Working with JDBC: Database concepts, Connection to server, creating database, creating a table, inserting data, altering tables, queries, JDBC Overview & Architecture, JDBC Driver Types, Connecting servlets with databases

UNIT-V

Introduction to JSP: JSP API, JSP Life Cycle, JSP Elements, JSP Directives, JSP Implicit Objects, Configuring Error Pages in JSP, JSP Scopes(request, session, application, page), JSP Standard Actions, MVC architecture, Introduction to Expression Language and JSTL

Learning Outcomes:

After completion of the course students will be able to -

- Describe the concepts of WWW including browser and HTTP protocol.
- Develop the modern web pages using the HTML5 and CSS3 features with different layouts as per the need of applications.
- Use JavaScript to develop the dynamic web pages and validate data entered by users through forms
- Use Servlets to generate the web pages dynamically using the database connectivity.
- Develop modern Web Applications using the client and server side technologies and the web design fundamentals.

Books Recommended:

1. Steven M. Schafer, “HTML, XHTML and CSS”, Fourth Edition by, Wiley India Edition
2. HTML 5, Black Book, Dreamtech Press
3. JDBC, Servlets and JSP Black Book, by Kogent Solutions Inc. Santosh Kumar K.
4. Web Technologies, Black Book, Dreamtech Press
5. Head First – Servlet and JSP - Bryan Basham, SPD O'REILLY, 2nd Edition.
6. Java Server Pages – Hans Bergsten, SPD O'REILLY, 3rd Edition
7. Web Design, Joel Sklar, Cengage Learning
8. Web Technologies – Achyut S Godbole and Atul Kahate
9. Jason Hunter, “Java Servlet Programming”, 2nd Edition, O'reilly Publications.

List of Practical Assignments:

During the learning of course, students need to do assignments:

1. Design web pages using HTML5
2. Style web pages using CSS3 features
3. Accepting and validating user entered data using JavaScript
4. Creating html pages to submit data to server
5. Write a program to demonstrate the use of Servlet request and response as well as doGet () and doPost () methods.
6. Collecting submitted data in a Servlet
7. Using redirection and request forwarding in Servlets
8. Write a Servlet to store form data to database – using Type 4 JDBC driver and Database connectivity support from server.
9. Experiment with scriptlets, declaration and expression tags
10. Writing java server pages to use JSP actions
11. Writing error pages in JSP
12. Develop sample application for session management using Servlet and JSP.
13. Develop sample application with database connectivity using Servlet/JSP

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5G3	L	T	P	L	T	P	Total
Applied Statistics	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To enable the students to use statistics in computer science for a number of things, including data mining, data compression, speech recognition, vision & image analysis, artificial intelligence and network & traffic modeling.

Prerequisite: Elementary statistics, matrices and determinants, probability.

COURSE CONTENTS

UNIT-I

Correlation and regression analysis – linear correlation and regression, regression plane, multiple and partial correlation. Random variables-discrete and continuous random variables, cumulative distribution function. normal distribution.

UNIT-II

Elements of Hypothesis Testing : Null and Alternative hypotheses, Simple and Composite hypotheses, Critical Region, type I and type II Errors, Level of significance and size, p-value. Test of significance of large and small samples. Test of goodness of fit and independence of attributes.

UNIT-III

Design of experiments: Principle of experimental design, complete randomized block design, randomised block design, ANOVA: one-factor and two factor classifications.

UNIT-IV

Stochastic processes; classification, special stochastic processes-Poisson process, Markov process, discrete-time Markov chains (MCs): Chapman-Kolmogorov equations, n-step transition probabilities, classification of states and limiting probabilities, continuous-time Markov chains (MCs): birth-death processes.

UNIT-V

Queuing Theory: Objectives and characteristics of a Queuing System, classification of Queuing models, probability distribution of arrival and service times, Models (M/M/1, M/M/C, M/E_k/1, M/D/1, D/D/1).Reliability: Basic Concepts, Evaluation of system reliability.

Learning Outcomes:

Upon completing the course, students will be able to:

1. use statistics for a specialist study of applications areas like developing speech recognition software, quality management, software engineering, storage and retrieval processes and software and hardware engineering and manufacturing. □

Books Recommended:

1. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, Mumbai, 6th Ed., 2009.
2. Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
3. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw - Hill Education, 2002.
4. K. S. Trivedi, Probability and Statistics with Reliability, Queuing, and Computer Science Applications, John Wiley & Sons, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT456 Software Workshop	L	T	P		T H	CW	S W	PR	Total
	-	-	2	Max	-	-	50	50	100
Duration of Theory Examination Only practical examination will be held				Min	-	-	25	25	50

Course Objectives: - To familiarize students about Visual Basic.NET its components, applications, and services. XML-based web page designing

Prerequisite: Visual Basic, HTML

COURSE OF CONTENTS

UNIT I

Introduction to .NET, VB6 and VB.NET differences, programming with .NET.

UNIT II

Object-Oriented Programming and VB.NET, Data Types, Variables and Operators, Arrays, Conditional Logic, Procedures, Dialog Boxes, Error Handling, Namespaces, Classes and Objects, Multithreading.

UNIT III

IDE for VB.NET, Data access in .NET, Windows Forms, Specific Controls, and Visual Inheritance.

UNIT IV

VB.NET and the Web, Introduction to ASP.NET, Page Framework, HTML Server Controls, Web Controls, Events. XML scripting and API for XML.

UNIT V

Web Services SOAP, WSDL, Disco and UDDI, Instantiating Invoking Web Services, Creating proxy classes with WSDL, Creating Web Service Project.

BOOKS RECOMMENDED:

[1] Bill Evjen, Jason Beres, Visual Basic.NET Programming, Bible, WILEY Dreamtech, 2005.

[2] Jeffrey R. Shapiro, Visual Basic.NET, The Complete Reference, Tata McGraw Hill, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Information Technology)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5L3 Scripting Language Programming Laboratory	L	T	P	L	T	P	Total
	0	0	2	0	0	1	1
Duration of Theory Paper: 3 Hours							

Learning Objectives: To learn basics and advance scripting language programming for modern computing requirements.

Prerequisite: Programming Concepts.

UNIT-I

Features of Python ,Setting up path ,Working with Python ,Basic Syntax ,Variable and Data Types ,Operator, If ,If- else ,Nested if-else, For ,While ,Nested loops. Break Continue Accessing Strings ,Basic Operations ,Function and Methods.

UNIT-II

Introduction of Sqlite, Database connectivity, Accessing tuples, Executing queries, Transactions ,Operations Working, Handling error Functions and Methods, Printing on screen Reading data from keyboard ,Opening and closing file ,Reading and writing files

UNIT-III

Graphics and GUI programming-Drawing using Tkinter and python. Networking and Multithreaded programming –Sockets, Thread and Processes, Chat application.

UNIT-IV

Class and object. Attributes, Inheritance ,Overloading ,Overriding ,Data hiding Regular expressions ,Match function ,Search function ,Matching VS Searching ,Modifiers ,Patterns, CGI(Introduction, Architecture ,CGI environment variable, GET and POST methods ,Cookies ,File upload.

UNIT-V

Web Frameworks - for developing server-side Web applications in Python, Web Browse Programming - interfacing with existing browsers and browser technologies

Learning Outcomes:

- After completion of the course students will be able to –
- Apply scripting language programming skills for modern computing requirements.

Reference Books:

- John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of india
- R. Nageswara Rao, “Core Python Programming”, dreamtech
- Wesley J. Chun. “Core Python Programming - Second Edition”, Prentice Hall
- Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley
- Kenneth A. Lambert, “Fundamentals of Python – First Programs”, CENGAGE Publication
- Luke Sneeringer, “Professional Python”, Wrox
- Hacking Secret Ciphers with Python”, Al Sweigart, URL <https://inventwithpython.com/hacking/chapters>

List of Practical Assignments:

Students are given programming assignments to learn following .

1. How to take input through file/command line/ network.
2. Concept of Python List, Python String, Python Dictionary, Python Tuples and data type conversion.
3. Techniques of function calling, modules like import, from import etc.
4. Basic I/O functions and exception handling in Python.
5. Concept of object oriented programming, built in class attributes, regular expressions for pattern matching.
6. To work with database interfaces (Sqlite).
7. Concept of networking using Python
8. Web development using web framework flask,bootstrap.
9. Use of XML, CSS, HTML, AJAX to understand the concept behind the web browsing.
10. A project to be developed which uses the above concept.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS406 Principles of Management	L	T	P		TH	CW	SW	PR	Total
	2	0	0	Max	-	50	-	-	50
Duration of Theory Paper: 3 Hours				Min	-	25	-	-	25

Course Objectives: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Principles & Functions of Management.

Prerequisite(s): - NIL

COURSE OF CONTENTS

Unit I

The Nature of Management: Definition and role of management; the function of a manager, Scientific management. Various schools of management thought. The Functions & Principles of management.

Unit II

Planning: Nature and purpose of planning, Components of planning objective of business.

Unit III

Organization: Nature and purpose of organizing Structure, Centralization, Decentralization, Span of control, Delegation of authority relationship. Formal and informal organization.

Unit IV

Directions & Staffing: Direction process, Theories of motivation and leadership, Need analysis, Communication.

Unit V

Control: Meaning and process of control, techniques of control evaluation, developing and compensating the employees, Merit rating.

BOOKS RECOMMENDED:

- [1]. Koontz and O'Donnel, Essentials of Management, 6/E TMH Jan. 1986
- [2]. R.D Agrawal, *Organization & Management*. 1/E PHI 1997
- [3]. Peter Drucker, *Practice of Management*, 1992
- [4]. Mc Farland, *Management, Principal and Practice*.
- [5]. L.M Prasad, *Principal and Practice & Mgt*.
- [6]. T.N Chhabra, *Principal and Practice & Mgt*, 1/E
- [7]. G.R Terry, *Principal of Management's*.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SIR5S5 Principles of Management	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours							

Learning Objectives:

Understanding Management Concepts.
Acquire the knowledge of business environment.

Managing behavior of human at organizations with modern management concepts.

Understanding business ethics and social responsibility as Engineers.To develop the capacity to lead in a variety of circumstances.

Pre requisite: Nil

COURSE CONTENTS

UNIT- I

Introduction to Management: Basic concepts of management: Definition, Essence, Principles, Roles, Level; Functions of management: Planning, Organizing, Staffing, Directing, Coordinating and controlling; Organizational efficiency & effectiveness; Roles of manager, Skills required in a manager.

UNIT- II

Management and Society: Organization: Types and Structure; Business environments: Political, Economic, Legal, Social, Technological and International environment; Designing effective organization: Span of management, Delegation, Centralization and Decentralization; Formal and Informal organization.

UNIT- III

Management of Human at Work: Human Resource Development: Interrelationship of managerial function; significance of staffing, Personnel management: Recruitment, Training,

Performance appraisal, Employee retention; Managerial communication; Motivating individuals and work groups, Leadership for managerial effectiveness.

UNIT- IV

Management Ethics for Engineers: Business ethics, Social responsibility of Business: Economical, Legal, Ethical and Philanthropic; Ethical responsibilities of Engineers toward society; Business and environment protection; Impact of engineering on society.

UNIT -V

Modern Management Concepts: MBO: Principles, steps, advantages and disadvantages; Strategic management-SWOT analysis; Team Building: Definition of Team, Team Formation, Approaches, Goal Setting and Communication among Team Members. Models of relationship between professional and client.

Case Study

Learning Outcomes:

At the end of the course, students should be able to do the following:

- Identify the key management processes and the relevance of management in organisations.
- Understand the key management skills required in organisations and how these might be applied.
- Evaluate their own managerial skills and the ways in which these might be developed.
- Understand Team members while working with people from different background.

Books Recommended:

1. R.D Agrawal, Organization & Management.1/E PHI 1997.
2. Tripathy PC And Reddy PN, Principles of Management, Tata McGraw-Hill, 5th Edition, 2012.
3. Dinkar Pagare, Principles of Management, Sultan Chand & Sons, 2000.
4. G.K.Vijayaraghavan and M.Sivakumar, Principles of Management, Lakshmi Publications, 5th Edition, 2009.
5. Harold Koontz & Heinz Weihrich, Essentials of Management – An International perspective, 8th edition. Tata McGraw-Hill, 2009.
6. Charles W.L. Hill and Steven L McShane, Principles of Management, Tata Mc Graw-Hill, 2009.
7. Fledermann, C.B., “Engineering Ethics,” Pearson Prentice Hall, Upper Saddle River, NJ, 2004.
8. Stephen P. Robbins, Timothy A Judge, Sanghi Seema Organizational Behavior, Pearson Education 13th Ed 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technology					
Subject Code & Name	Periods Hours/ W	Marks	Th	CW	SW	Pr	Total
4IT454 Wireless Protocols & Mobile Computing	Lectures- 4 Tutorials-0	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	Practical- 2	Min	35	25	25	25	110

Objective: To give exposure to the students on wireless communication with emphasis on protocol design and computing on mobile nodes.

Course of Contents

Unit I

Introduction, Wireless Networks, Wireless VS Wired Networks, Mobile Devices, Mobile Applications, Mobile Environment and limitations, Wireless transmission, Multiplexing, Modulation, Spread spectrum-DSSS & FHSS

Unit II

Cellular networks- overview, Cellular Concept, Frequency Reuse, Channel Allocation, Call Setup, Cell Handoffs, Location Management, Medium Access Control-motivation for specialized MAC, SDMA,FDMA,TDMA, Reservation Aloha, PRMA, MACA, DSMA, CDMA, GSM-Basics, GSM-Air Interface, protocols, localization & calling

Unit III

Wireless LANs, 802.11 System & Protocol Architecture, MAC layer-DFWMAC-DCF with CSMA/CA, CTS/RTS extension & polling, MAC management, Mobile IP, TCP over wireless, TCP and mobility

Unit IV

~~Designing mobile applications, Mobile agents transcoding and proxy architecture, wireless web and WAP, J2ME basics, Mobile Application development using J2ME, Data broadcasting, and Location based computing,~~

Unit V

~~Information management: data dissemination and broadcast models, mobile database and mobile transaction, location Independent and location dependent computing models, Human computer interactions: reduced user interfaces, wearable and pervasive computing; Use of XML & UML in mobile interfaces~~

Books Recommended:

- [1] J Schiller, Mobile Communications, Pearson Education, 2003
- [2] W. Stallng, Wireless Communications & Networks, Pearson Education, 2/e, 2005
- [3] A Talukdar, RYavagal, Mobile Computing: Technology, Applications & Service —Creation, McGrawHill, 2006
- [4] Reza B Far, Mobile Computing Principles: Designing and Developing Mobile Applications

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology) (Full Time)				
Subject Code & Name		Instructions Hours per Week		Credits				
ITR6C1 Wireless Protocols and Mobile Networks Engineering		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	-	3	1	-	4

Learning Objectives:

- To understand the basic concepts of wireless communication with focus on mobile Networking.
- To provide knowledge of different techniques of wireless communication.
- To learn about integration of services and applications from fixed networks into mobile networks.

Prerequisite: Basic knowledge of Computer Networks.

COURSE CONTENTS

UNIT-I

Introduction: Wireless Networks, Wireless vs Wired Networks, mobile devices, mobile applications, mobile environments and limitations, Wireless transmission-frequencies and regulation, **multipath propagation, channel fading**, Multiplexing and Modulation techniques, Spread spectrum-DSSS & FHSS,

UNIT-II

Medium Access Control: motivation for specialized MAC, **Hidden/Exposed, Near/Far terminal effect**, MAC protocols –SDMA,FDMA,TDMA, Reservation Aloha, PRMA, MACA, DSMA etc.

Cellular networks : overview, Cellular Concept and Frequency Reuse, Channel Allocation, Call Setup, Cell Handoffs, Location Management, CDMA, GSM- Architecture, GSM-Air Interface, protocols, **HLR/VLR**, localization & calling, **security, GPRS.**

UNIT-III

Wireless LAN : Infra vs Radio transmission, infrastructure vs ad hoc network,IEEE 802.11- system and protocol architecture, MAC management, IEEE 802.11 flavours, Bluetooth – architecture, radio and basband layer, L2CAP, IEEE 802.15, WiMax and Zigbee overview

UNIT-IV

Mobile Network Layer: Entities, Packet delivery, Agent Discovery, Tunneling and encapsulation, optimization, reverse tunnelling,

Mobile Transport Layer: Congestion control and implication of mobility, slow start, Mobile TCP – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/ Fast recovery. **Support for Mobility** – File System – CODA, WAP –Architecture,

UNIT-V

Mobile Adhoc Networks: Protocols and Routing,

Advances in Mobile Technologies: 5G and Beyond, Internet of Things (IoT), Internet of Every Thing (IoE), Wireless Sensor Networks, Mobile Opportunistic Networks

Wireless Network Planning and Administration: Wireless Hardware, Wireless Network Design and Deploy, Troubleshooting hardware and connection issues.

Learning Outcomes:

Upon completing the course, students will:

- Be familiar with wireless communication methodologies
- Learn wireless communication protocols and different standards
- Be able to apply these concepts in Wireless Network planning, design and administration to support mobility.

B

Books Recommended:

1. Jochen Schiller, Mobile Communications, Pearson Education, 2/e, 2003.
2. W. Stalling, Wireless Communications & Networks, Pearson Education, 2/e, 2005.
3. Dharma P. Agrawal and Qing-An Zeng, Introduction to Wireless and Mobile systems, Cengage Publication, 2012.
4. Wale Soyinka, Wireless Network Administration- A Beginner's Guide, Tata McGraw-Hill Edu, 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT452 Analysis of Algorithm	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: This course aims to introduce approaches for analyzing algorithms in various domains, and techniques for designing efficient algorithms. Upon completion of this course the student should be able to:

1. Apply the algorithms and design techniques to solve problems;
2. Have a sense of the complexities of various problems in different domains.

Prerequisite: Knowledge of data structures may assist the learning process.

COURSE OF CONTENTS

Unit-I

Introduction to Algorithms: Design & analysis issues; Types of algorithms; Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

Unit-II

Analysis of Some Sorting and Searching Algorithms: Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements.

Unit-III

Algorithms Design Techniques: Divide-and-Conquer, Greedy Method, Dynamic programming, Backtracking and Branch-and-Bound; Illustration of above strategies using appropriate examples like; Knapsack problem, Optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, Queens problems, Traveling salesperson problem etc.

Unit-IV

Analysis of Matrix and Polynomial Algorithms: ~~Boolean Matrix Multiplication's;~~ Strassen's matrix multiplication; ~~Matrix chain multiplication problem;~~ Solving Linear Equations; ~~Computation of polynomials~~ Horner's method. String matching algorithms.

Unit-V

Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Computational classes: – P, NP, NP-Complete, and NP-Hard; reducibility, Decision and optimization problems,

Some NP and NP-Hard problems: Hamiltonian cycle, Traveling Salesperson (TSP). Satisfiability, Clique problems etc.

BOOKS RECOMMENDED:

- [1] T.H. Cormen, C.E. Leiserson and R.L. Rivest, Introduction to Algorithms, Prentice Hall of India, 1990.
- [2] E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
- [3] Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 2/e, 1988.
- [4] Knuth, D, The art of computer programming , Vols. 1-2-3, Addison Wesley 1968-73.
- [5] A V Aho, J E Hopcroft & J D Ullman, *The Design and Analysis of Computer Algorithms*, Addison Wesley, 1974.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR6C2 Design and Analysis of Algorithms	L	T	P	L	T	P	Total
	3	1	1	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
2. Knowledge of algorithm design strategies
3. Familiarity with an assortment of important algorithms
4. Ability to analyze time and space complexity

Prerequisite:

The students are required to have familiarity with the following data structures: Arrays and linked lists, Stacks and queues, Graphs and trees, binary search trees, height balancing, Heaps and priority queues

COURSE CONTENTS

UNIT-I

Introduction to Algorithms: Notion of algorithms, properties, important areas of research in connection with the study of algorithms, Types of algorithms; Analysis- best case, worst case, and average case. Performance issues - Time and space complexity; Asymptotic analysis. Mathematical preliminaries; functions & their growth rates; Recurrence relations, Methods for solving recurrences.

UNIT-II

Selected Algorithms for Sorting, Searching and matrix multiplication: Elementary sorting techniques: Selection, Bubble, and Insertion sorts; Advanced sorting techniques: Heap, Merge and Quick sorts; Radix & Bucket sorts. Searching techniques: Linear and binary search; Searching minimum and maximum elements. Divide-and-Conquer strategy, Strassen's matrix multiplication.

UNIT-III

Greedy Method and Dynamic Programming: Algorithms design techniques based on Greedy Method and Dynamic programming. Illustration of these strategies using appropriate examples including Knapsack problem, optimal storage on tapes, finding shortest path, all pairs shortest path, finding minimum cost spanning trees, and Matrix chain multiplication problem.

UNIT-IV

Backtracking, Branch-and-Bound, and String Matching: Backtracking and Branch-and-Bound algorithm design techniques, Illustration of these techniques using appropriate examples like Queens Problem, subset sum problem, traveling salesperson problem, etc.

Introduction to string matching problem, Applications, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc.

UNIT-V

The Theory of NP-Completeness:

Non-deterministic Algorithms: Introduction. Nondeterministic Complexity, Decision and optimization problems, Tractable and Intractable Problems, Computational Classes: – P, NP, NP-Complete, and NP-Hard; reducibility, Selected NP-Complete and NP-Hard problems: **Hamiltonian cycle**, Traveling Salesperson (TSP). Satisfiability, Clique problems, etc.

Learning Outcomes:

Students who have completed this course should be able to:

- Apply design principles and concepts to algorithm design
- Have the mathematical foundation in analysis of algorithms
- Understand different algorithmic design strategies
- Analyze the efficiency of algorithms using time and space complexity theory

Assessment methods of all of the above: quizzes, exams, assignments, practicals

Books Recommended:

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, Second Edition, MIT Press/McGraw-Hill, 2001.
2. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
3. Jon Kleinberg and ÉvaTardos, Algorithm Design, Pearson, 2005.
4. E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
5. Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 2/e, 1988.
6. Knuth, D, The art of computer programming, Vols. 1-2-3, Addison Wesley 1968-73.
7. A V Aho, J E Hopcroft& J D Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.
8. Vijay V Vazirani, Approximation Algorithms, Springer-Verlag, 2001

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technology					
Subject Code & Name	Periods Hours/	Marks	Th	CW	SW	Pr	Total
4IT453 Network & Information Security	Week Lectures- 4	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	Tutorials-0 Practical- 2	Min	35	25	25	25	110

Objective: To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

Pre-requisite: NIL

Course of Contents

UNIT-I

The need for security, security approaches, principles of security, services, mechanisms & attacks, model for network security. Plain & Cipher text, substitution & transposition techniques, play fair cipher, hill cipher, stenography, key range & key size.

UNIT-II

Diffie-Hellman key exchange. An overview of symmetric key cryptography, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

UNIT-III

Brief history & overview of asymmetric key cryptography, RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

UNIT-IV

Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3-D Secure Protocol, Email Security, Kerberos.

UNIT-V

Introduction, brief introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing.

Books Recommended:

1. Douglas R. Stinson; *Cryptography Theory and Practice*; 2nd Edition, Chapman & Hall/CRC
2. Williams Stallings; *Cryptography & Network Security*; 3rd Edition, Pearson Education

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR5C3 NETWORK & INFORMATION SECURITY	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To impart the knowledge and in-depth reference to current information and network security standards and procedures.
- This course provides you with an overview of data and computer security and concentrates in technical and continuity management issues.
- Allow the student to gain expertise in some specific areas of information security such as the design and providing security to individual networks.

Pre requisites :

Basic knowledge of programming and computer Networks

COURSE ONTENTS

Unit I

Introduction: The need for security, security approaches, principles of security, services, mechanisms & attacks, model for network security. Plain & Cipher text, substitution & transposition techniques play fair cipher, hill cipher, stenography, key range & key size.

Unit II

Symmetric Key Algorithms: Diffie-Hellman key exchange, An general idea of symmetric key cryptography, Algorithm types & modes, possible types of attacks, Symmetric & asymmetric cipher model, Data Encryption Standard (DES), Advanced Encryption Standard (AES).

Unit III

Asymmetric Key Algorithms: Brief account and general idea of asymmetric key cryptography, RSA algorithm, asymmetric & symmetric key cryptography together, digital envelopes, digital signatures & digital certificates & Public key infrastructure (PKI).

Unit IV

Information Security Protocols: Secure Socket Layer, Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), 3- D Secure Protocol, Email Security, and Kerberos.

Unit V

Network Security: Introduction, brief introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks, Intrusion detection system, IP spoofing, DNS spoofing. Introduction to block chain technology and crypto currency.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Acquire a practical overview of the issues involved in the field of information security.
2. Demonstrate a basic understanding of the practice of IS, especially in evaluation of information security risks across diverse settings including the Internet and WWW based commerce systems, high bandwidth digital communications and funds transfer services.
3. The learning outcome is students shall be able to understand what are the common threats faced today, what are the foundational theory behind information security, what are the basic principles and techniques when designing a secure system, how to think adversarial, how today's attacks and defences work in practice, how to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.
4. Familiarity with the basic protocols of Information Security, and how they can be used to assist in network security design and implementation.

Books Recommended:

- Douglas R. Stinson; Cryptography Theory and Practice; 2nd Edition, Chapman & Hall/CRC
- Williams Stallings; Cryptography & Network Security; 3rd Edition, Pearson Education
- Bernard Menezes; Network Security and Cryptography; Cengage Learning India Pvt Ltd.
- Neal Krawetz; Introduction to Network Security; 2nd Edition, Thomson Learning Inc.

List of Practical Assignments:

During learning of course, students need to do assignments:

1. Implementation of various symmetric key algorithms.
2. Implementation of various asymmetric key algorithms.
3. Implementation of Algorithm types and modes (Electronic Code Book (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB)).
4. Study of Pretty Good Privacy open source security tool for e mail security.
5. Implementation of digital certificates.
6. Study of IP Tables.
7. Implementation of various open source security tools (Wireshark, nmap, iptables, pretty good privacy, Snaort, LC5, OpenVPN, TrueCrypt, THC Hydra).

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR6E1 Software testing & quality assurance	L	T	P	L	T	P	Total
	Duration of Theory Paper: 3 Hours	3	1	2	3	1	1

Learning Objectives: To develop software testing skills and create awareness about software quality assurance processes.

Prerequisite: Good knowledge of software Engineering and programming.

COURSE CONTENTS

UNIT-I

Software Testing Principles: Fundamental of software testing: History, Prerequisite for testing, Testing Principles and Concepts, Scope of testing, testing constraint, software development Life cycles (SDLC), Agile software development, software testing life cycle (STLC), 'V' concept of testing, challenges in testing, Testing process: fundamental test process, role and responsibility.

UNIT-II

Verification and Validation: Levels of testing: Unit, Integration and System Testing, Acceptance testing, Test case Planning, Test case Design, Test case template, Test case execution, Test case misconception, Test case management.

UNIT-III

Static and Dynamic Testing: White Box Testing techniques and methodology, statement coverage, branch coverage, single /multiple condition coverage, data flow coverage. Black Box Testing: boundary value analysis, Equivalence partitioning, System testing: functional and non-functional testing, Acceptance testing, Integration testing, database testing

UNIT-IV

Testing Strategies: Bug, bug life cycle, defect management life cycle, defect severity and priority, test matrices, fuzz testing, special testing: UI testing, load testing, stress testing, performance testing, configuration testing, compatibility testing, security and recovery testing. Factors and Methodology for Performance testing, Regression testing: Methodology for Regression testing.

Mobile apps testing: Mobile app testing (popular apps), game testing, mobile testing tools: Appium, Calabash, Monkey Talk, Robotium, EggPlant.

Case study: Social Media, compiler, project under ISRO, NASA, DRDO, System Driver, kernel. Hard real time applications testing.

UNIT-V

Quality Assurance & Automation: Quality Assurance and Software Quality management, CMM levels, CMMI, ISO 9000 standard, Metrics for software quality, Risk management, Automation Testing tools: QTP (10.0), VSTS - WebTest, Load Runner, Performance Testing, Selenium

Bug management tools: Bugzilla, Winrunner, TestDirector

Learning Outcomes:

Upon completing the course, students will be:

1. Familiar with software testing tools and techniques, and software quality assurance processes.
2. Able to apply skills for quality software development as per requirement.

Books Recommended:

1. Srinivasan Desikan&Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education, 2006
2. R. Patton; Software Testing; Techmedia (SAMS) 2000
3. Glenford J. Myers, “The Art of Software Testing ”, John Wiley & Sons, 1979.
4. Boris Beizer, Black-Box Testing: “Techniques for Functional Testing of Software and Systems ”, John Wiley & Sons, 1995.
5. Beginner's Guide for Mobile Applications Testing Paperback – 28 May 2015 by Jeesmon Jacob
6. How to Test Mobile Applications: A Practical Guide to Mobile Application Testing Kindle Edition by Kishore Nuvvula
7. Software Testing Tools by K.V.K.K Prasad.

List of Practical Assignments:

Students are given programming assignments to learn following.

1. SDLC, agile and STLC phases.
2. Test website performance with different parameters using GTmatrix, PageSpeed.
3. Check Web Browsers performance for loading websites.(as IE, Mozilla, Opera, Chrome, UC Browser.
4. Prepare & execute test cases for application and system software.
5. Perform load testing for web application using LoadRunner, Jmeter, WebLOAD.
6. Perform web security testing using AppScan, WebScarab.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester IV					
Subject Code & Name	Instructions Hours per Week			Marks					
2IT453 System Programming	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Course Objectives: To familiarize with the fundamentals of design and implementation of system software.

Prerequisite(s): Computer Programming, Data Structures

COURSE OF CONTENTS

Unit-I

Introduction : Need of System Program, distinction with Application program, language processors, language processing- Fundamentals, principles of programming languages, Data structures for language processing search and allocation type, , language specification, system software- ~~editors, debuggers~~, assembler, compiler, interpreter.

Unit-II

Assembler: Overview of assembly language program, ~~Design of Assembler pass structure, intermediate code, Macros and Macro processors macro definition, processing, design.~~

Unit-III

Compiler – Introduction & Parsing Techniques: Compiler and Translators, pass structure of compiler, design of lexical analyzer, Basic Parsing Techniques: top down approach- recursive descent parsing predictive parsing, Bottom-up approach-Shift-reduce parser, operator precedence parser, LR parser, Syntax -Directed translation, ~~parser generators.~~

Unit-IV

Compiler Code Generation & Optimization: Intermediate code generation, memory allocation, compilation of expressions and control structures, code optimization.

Unit-V

Loader & Linker Design Issues: Interpreters, Linker & Loader- concepts, ~~program relocation schemes, overlays, Shared libraries, dynamic linking and loading.~~

BOOKS RECOMMENDED

- [1] D.M. Dhamdhere – *Systems Programming and operating System*, 2nd ed rev., Tata McGraw-Hill, 2005
- [2] L.L. Beck, *System Software An Introduction to Systems Programming*, Pearson Education, 2003
- [3] A.V. Aho, R.Sethi, J.D. Ullman – *Compilers Principles, Techniques and Tools*, Pearson Education, 1999.
- [4] David Galles, *Modern Compiler Design*, Pearson Education, 2007
- [5] John R. Levine, *Linkers & Loaders*, Morgan Kaufmann Publisher

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR6G4 Compiler Design	L	T	P	L	T	p	Total
	3	1	2	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide a framework for understanding the fundamentals of Compiler.
- To familiarize students with new Compilation Problems.
- Develop skills to understand how to Design a Compiler.
- Develop ability to understand how to enhance performance of a Compiler for newly evolved Programming Languages.

Prerequisite:

Knowledge of Computer Programming, Data Structures, Discrete Mathematics. Knowledge of several different Programming Languages will be useful.

COURSE CONTENTS

UNIT-I

Introduction to Compiling: Compilers: The Analysis-Synthesis Model of Compilation; Analysis of the Source Program: Lexical Analysis, Syntax Analysis, Semantic Analysis; The Phases of a Compiler: Symbol-Table Management, The Analysis Phases, Intermediate Code Generation, Code Optimization; Cousins of the Compiler: System Software, Interpreters, Preprocessors, Assemblers, Linkers and Loaders, Macros; The Grouping of Phases: Front and Back Ends, Passes; **Compiler Construction Tools.**

UNIT-II

Lexical Analysis: The Role of the Lexical Analyzer: Lexical Analysis Versus Parsing, Tokens, Patterns and Lexemes, Attributes for Tokens, Lexical Errors; **Specification of Tokens: Strings and Languages, Regular Expressions; Recognition of Tokens: Transition Diagrams; Finite Automata:** Nondeterministic Finite Automata, Deterministic Finite Automata; From Regular Expression to Automata: Conversion of an NFA to DFA, Construction of an NFA from a Regular Expression.

UNIT-III

Syntax Analysis: Introduction: The Role of the Parser, Classification of Grammars; Context-Free Grammars: Parse Tree and Derivations, Ambiguity, CFG Versus Regular Expressions; Writing a Grammar: Lexical Versus Syntactic Analysis, Eliminating Ambiguity; Top-Down Parsing: Recursive Descent Parsing, LL(1) Grammars, Nonrecursive Predictive Parsing;

Bottom-Up Parsing: Reductions, Shift Reduce Parsing; LR Parsing: Simple LR, Constructing SLR-Parsing Tables, **Constructing LALR Parsing Tables.**

UNIT-IV

Intermediate-Code Generation and Run-Time Environment: Variants of Syntax Trees: Directed Acyclic Graphs for Expressions; Three Address Code: Addresses and Instructions, Quadruples, Triples; Type Checking: Rules for Type Checking, Type Conversions; Storage Organization: Static Versus Dynamic Storage Allocation; **Stack Allocation of Space; Activation Trees; Introduction to Garbage Collection.**

UNIT-V

Code Optimization and Planning a Compiler: Basic Blocks and Flow Graphs: Basic Blocks, Flow Graphs; Optimization of Basic Blocks: The DAG Representation of Basic Blocks, Local Common Subexpressions Elimination, Semantic Preserving Transformations; Loop Optimization; **Virtual Machines and their Interpreters; The LLVM Modular and Reusable Compiler Technologies, Overview of The HiPE Compiler; Case Studies of Compilers and Future Trends: The Sun Compilers for SPARC, The IBM XL Compilers for the POWER and POWERPC Architecture.**

Learning Outcomes:

1. Upon completing the course, students will be:
2. Acquire advance knowledge and understanding of Compiler.
3. Use skills in Compiler Design.
4. Apply acquired knowledge to improve performance of a Compiler.

In addition to development in technology computer architectures offers a variety of resources of which students will be able to innovate in the Compiler Design.

Recommended Books:

- Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.
- Compilers: Principles, Techniques, and Tools; Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman; Pearson Education.
- System Programming: D M Dhamdhere; McGraw Hill Education.
- System Programming and Operating Systems: D M Dhamdhere; McGraw Hill Education.

Suggested Exercises:

For a Defined Language:

- Design a symbol table mechanism.
- Write an interpreter for quadruples.
- Write the lexical analyser.
- Write the semantic actions.
- Write the parser.
- Write the error-handling routines.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Common to All Branches)					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS456 Entrepreneurship Development & IPR	L	T	P		TH	CW	SW	PR	Total
	2	0	0	Max	-	50	-	-	50
	Duration of Theory Paper:			Min	-	25	-	-	25
Only internal Test									

Objectives: To impart the basics of Entrepreneurship development Concepts. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur. To impart the basics of Intellectual property Rights.

Prerequisite: Nil

COURSE CONTENTS

UNIT I

Introduction: Definition of Entrepreneurship and role of an entrepreneur. Entrepreneurial characteristics, values and attitudes. ~~Entrepreneurship development programmes.~~

UNIT II

Modes & Methodology of setting up a Small Scale Industry: Project Identification, Market Survey, Location & Building, Technical Know - How, Raw material & other Utilities, Professional & Skilled Manpower, Project Report, Finance, Whom to Approach.

UNIT III

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions. ~~Registration of a small scale Industry.~~

UNIT IV

Intellectual Property Rights: Introduction of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators, Sharing of Knowledge, Trade Marks etc. General Provisions & Basic principles of IPR.

UNIT V

Patents: Definitions, Need for a patents, ~~what can be patented, Patent laws, Rights of Patent Holders, Filing of a Patent, Industrial Scenario.~~

BOOKS RECOMMENDED:

[1]. Colombo plan staff college for Technician Education, Manila , *Entrepreneurship Development*, Tata McGrawHill 1998

[2].N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Information Technology (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SIR6S6	L	T	P	L	T	P	Total
Entrepreneurship Development & IPR	2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours							

Learning Objectives:

1. To provide awareness about entrepreneurship.
2. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
3. To self motivate the students by making aware of different opportunities and successful growth stories
4. To impart the basics of Intellectual property Rights.

Pre requisite:Nil

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise- Definition and Classification (MSME- Micro, Small & Medium Enterprises).

Case Study: Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model.

Class Activity: Idea generation by students.

UNIT III

Business Plan for Start-ups in IT Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks.

Learning Outcomes:

At the end of the course, students should be able to do the following:

1. Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business
2. Understand entrepreneurial process by way of studying different cases and performing class activities.
3. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, “Entrepreneurship”, 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
4. Bruce R. Barringer and R. Duane Ireland, “Entrepreneurship”, 4th Edition, Pearson Publications, New Delhi, 2011.
5. N.K. Acharya, Text book on intellectual Property Rights, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Information Technology)					
Subject Code & Name	Instructions Hours per Week			Marks					
3IT453 Server Side Programming	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective: To learn web development using server side programming technologies and to develop skills for building web application with dynamic contents.

Prerequisite: Knowledge of Java Programming language (core), HTML and basics of SQL.

COURSE OF CONTENT

Unit I

Introduction: HTTP protocol: Http request, Http response; web container and web server overview; web application.

Unit II

Database Connectivity with Middle tier: Database drivers; API for interaction with database; Connection pooling; Transaction.

Unit III

Server Side Technology: Comparisons of prevalent server side technologies; Servlet basics; Servlet lifecycle; Implicit objects; scope.

Unit IV

Session Tracking : Approaches to session tracking; Session tracking with JAVA servlet API; Servlet collaboration.

Unit Z

JAVA Server Pages: JSP overview; Directives; Scripting elements; Standard actions, Implicit objects; Scope; XML – equivalent tags; JSP design basics; Dispatcher approach; Introduction to JSP tag extension. Introduction to CGI, PHP and ASP. Comparison of these technologies with servlet and JSP.

BOOKS RECOMMENDED:

- [1] J2EE Tutorial from www.java.sun.com.
- [2] JAVA servlet programming, Jason Hunter, William Crawford, O'Reilly, SPD.
- [3] Professional JAVA server programming, J2EE edition, volume I, Wrox, SPD.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technology					
Subject Code & Name 4IT455 Cloud Computing	Periods Hours/ Week Lectures- 4 Tutorials-0 Practical- 0	Marks	TH	CW	SW	Pr	Total
		Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours		Min	35	25	-	-	60

Objective: To Introduce the cutting edge technology in Internet Computing Technology.

Prerequisite: Fundamentals of Network Technology, Fundamentals of Internet Technology.

Course of Content

Unit-I

Introduction to Cloud Computing: Cloud introduction and overview, Cloud Computing Technology, ~~Hardware & software Infrastructure~~, Different clouds, Risks, Cloud Services, Applications, ~~Regulatory Issues, and Limitations.~~

Unit-II

Cloud Computing Architecture: Requirements, Introduction Cloud computing architecture, various kind of Cloud computing architecture, ~~Grid Computing, Transactional Computing, On Demand Computing, Distributed Computing.~~

Unit-III

Virtualization: Virtualization at the infrastructure level, CPU Virtualization, Storage Virtualization, Network Virtualization, A discussion on Hypervisors, ~~SAN, ISCSI, VLAN. Scaling a Cloud Infrastructure.~~

Unit-IV

Security: Security issues in cloud computing, Data Security: ~~Data Control, Encryption, Regulatory and Standard Compliance, Network security: Firewall Rules, Network Intrusion Detection, Host Security aspects:~~

Unit-V

Disaster Management: Disaster Recovery Planning: Recovery Point Objectives, Recovery Time Objectives, Disaster management in cloud: ~~Backup management Geographic redundancy, Disaster Management: Monitoring, Load Balancing, Database Recovery.~~

Books & References:

[1] Cloud Application Architectures. George Reese. Publication O'Reilly,2009

[2] Cloud Computing: A Practical Approach. Anthony T.Velte, Tobe J.Velte, Robert Elsenpeter. Publication Pearson Education.,2009

[3] White Papers on Cloud Computing

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7C1 Cloud Computing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To provide knowledge of cloud architecture, deployment models.
To introduce broad perceptive of cloud services.
- To introduce about storage and database management in cloud computing.
To make them understand about resource management in cloud computing
- To make them familiar with the various cloud security issues and research trends in cloud

Pre requisites: Fundamentals of Computer Network, Storage and Internet Technology

COURSE CONTENT

UNIT-I

Introduction to Cloud Computing and Cloud Computing Architecture: Computing era, Cloud evolution, Principles of Parallel and Distributed computing, Web services, Cloud Computing Introduction, Characteristics as per NIST, Need of Cloud Computing, Cloud Computing Reference Model, Cloud Architecture, Cloud Service Models, Cloud Deployment Models, Cloud Adaptation Policy.

UNIT-II

Virtualization and Migration: Concept, Benefits of Virtualization, Challenges in Virtualization, Characteristics of Virtualized environments, Virtualization Techniques, Hypervisor, Components of Virtualization, Hot and Cold conversion, Resource Virtualization, Virtualization Platforms.
Cloud Migration: Migrating Strategies, Risk Associated, Precautions

UNIT-III

Inter Cloud Computing/Federated Environment:

Legal and Compliance Issues- - Global Exchange of Cloud Resources, Inter Cloud Resource Management, Service level Agreement management. Cross Border Data Storage Issue, Cloud Governance Model, Compliance monitoring, Ownership of Data, storage and backup policy.
Federated Cloud- Characteristics, Cloud Federation Stack, Motivation for Cloud

Interoperability, Cloud Interoperability Scenario, Challenges, Intercloud enabling techniques, Inter-Cloud Standards, Inter-Cloud Project examples.

UNIT-IV

Threats, Security and Disaster Management in Cloud Computing:

Cloud threats- Threat actors in cloud, Current Threats in cloud, Mitigation techniques for Cloud threats, Cloud Contracting models, Methods for Data loss prevention, Viability of third party services vendors.

Data Security issues in Cloud storage- Cloud Security Challenges, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data in Rest, Data in Motion, Identity and Access Management, Authentication Services in cloud.

Disaster Management- Disaster recovery as a service model (**DRaaS**), Recovery Point Objectives, Recovery Time Objectives, Monitoring, Load Balancing, Database Recovery, Business Continuity.

UNIT-V

Resource Management in Cloud Computing, Case Studies, Advance Topics: Performance and Scalability of Cloud Services, Data Centre, Components, Architecture with Reference Model, Resource Provisioning and allocation approaches, Challenges in Resource Management.

Cloud Platforms: Case studies on Cloud Platforms - Amazon web services, Google App Engines, Microsoft Azure, Salesforce Cloud.

Cloud Application Development, Green Computing, Fog Computing, Big Data application on Cloud, Cloud Mining, Mobile Cloud.

Cloud Deployment- Setting up a Small Cloud, Cloud Simulator.

Learning Outcomes:

- Upon completing the course, students will be able to:
- Understand about cloud architecture and deployment models Learned about broad perceptive of cloud services
- Learned about database management in cloud computing
- To make them understand about resource management in cloud computing
- To make them familiar with the various cloud security issues and research trends in cloud

BOOKS RECOMMENDED:

- Rajkumar Buyya; Cloud Computing Principles and Paradigms; John Wiley & Sons 2011.
- Rajkumar Buyya; Mastering Cloud Computing; Elsevier Inc 2013.
- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010.
- Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach” McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.

List of Practical Assignment:

During the learning of course, students need to do assignments:

- Configuration of Baremetal or Para Hypervisor.
- Study of various cloud data centers and green cloud models.
- Installation and configuration of Eucalyptus/Aneka cloud.
- Study of cloud CRM applications i.e Salesforce, Zoho.
- Hadoop Configuration with Hortonworks.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Information Technology) Semester IV					
Subject Code & Name	Instructions Hours perWeek			Maks					
					TH	CW	SW	PR	TOTAL
2IT452 Computer Graphics	L	T	P	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	4	-	2	Min	35	25	25	25	110

Course Objectives: To familiarize with the basics of theory and practice of computer Graphics.

Prerequisite(s): Computer Programming; knowledge of programming language: C/C++/JAVA

COURSE OF CONTENTS

Unit-I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

Unit-II

Devices: Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; Hard Copy devices: Printers and Plotters; Input devices: Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

Unit-III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

Unit-IV

Three Dimensions: 3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, Bspline.

Unit-V

Shading and color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

BOOKS RECOMMENDED

- [1] Hearn Donald and Baker M.Pauling, *Computer Graphics*, 2/e, Prentice Hall of India.
- [2] Hearn Donald and Baker M.Pauling, *Computer Graphics with OpenGL*, 3/e, Prentice Hall, 2004.

- [3] David F. Rogers, *Procedural Element of computer Graphics*, McGraw Hill International.
- [4] William M. Newman Robert F. Sproull, *Principles of Interactive Computer Graphics*, McGraw Hill.
- [5] J.D. Foley, A. van Dam, S.K. Feiner, J.F. Hughes, and R.L. Philips, *Introduction to ComputerGraphics*, Addison-Wesley, 1994.
- [6] Zhigang Xiang and Roy Plastock, *Computer Graphics*, Tata McGraw Hill Publications.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Information Technology (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7C2 Computer Graphics	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide knowledge of different techniques used for visual object representation.
2. Familiarize students with different hardware/ software and algorithm implementation used by today's input/output devices.
3. Develop skills to design and implement various 2D/3D objects representation in virtual reality.
4. Learning about the basics of computer based games and data visualization.

Pre requisites: Programming language: C++/JAVA.

COURSE CONTENTS

UNIT-I

Introduction: Application of Computer Graphics, Raster Graphics Fundamentals: Scan conversion, Pixel, Frame Buffer. Graphics Primitives; Line algorithms Circle algorithms, Ellipse, Character generation, Polygon Representation, inside test, Polygon filling algorithms, Antialiasing.

UNIT-II

Display devices: Random scan and Raster scan monitors, Colors CRT monitor, Plasma Panel; Hard Copy devices: Printers and Plotters; Input devices: Joysticks, Mouse, Digitizer, Scanner, and Camera; Input Techniques;

UNIT-III

Windowing and clipping: 2D Transformation, Raster method of Transformation, Window, View port, Viewing, Window to View port Transformation, Line clipping algorithms, Polygon clipping algorithms.

UNIT-IV

Three Dimensions: 3D Modeling techniques, 3D Display Techniques, 3D Transformation, Viewing Parameters, Hidden Surface and back face removal algorithms. 3D Curves & Surfaces: Bezier, B spline.

UNIT-V

Shading and Color Models: Diffuse illumination, Point source illumination, Reflection, Refraction, Transparency, Shadows, Polygon rendering algorithms, Dithering, Half toning, Color Models and applications.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Able to learn the basics of 2D/3D design and its implementations.
2. Able to write programs for latest Input/ Output Devices and Human computer Interaction.
3. Students will be aware about the latest technology used in display technology.

BOOKS RECOMMENDED:

1. Hearn Donald and Baker M. Pauling, Computer Graphics, 2/e, Prentice Hall of India.
2. Hearn Donald and Baker M. Pauling, Computer Graphics with OpenGL, 3/e, Prentice Hall, 2004.
3. David F. Rogers, Procedural Element of computer Graphics, McGraw Hill International.
4. William M. Newman Robert F. Sproull, Principles of Interactive Computer Graphics, McGraw Hill.

List of Practical Assignments:

1. Implement various line drawing algorithm & compare it on the basis of performance and prepare the table.
2. Implement various Circle drawing algorithm & compare it on the basis of performance and prepare the table.
3. Implement Cohen Sutherland and Cyrus Back line clipping algorithms and display the clipped portion of line as demonstration.
4. Implement Cohen Hoghman polygon clipping algorithm to clip a polygon against a rectangular boundary and combine Cohen Hoghman polygon clipping algorithm with Cyrus Back line clipping algorithms to clip a polygon against another polygon and display the clipped portion of polygon.
5. Implement the following 2D transformation using matrix multiplication: Translation Rotation Scaling Shearing Reflection
6. Implement parallel (oblique and axonometric) and perspective projection and display following objects using projections: Pyramid and Rectangles
7. Implement the following 3D transformation using matrix multiplication. And display using perspective projection: Translation Rotation Scaling Shearing Reflection
8. Implement rotation of an object about any arbitrary axis.
9. Implement reflection of an object about any arbitrary plane. 11. Implement the L-system for generation of symmetric objects (Fractals)
10. Generate 2D curve and surfaces using implementation of Bezier curve.
11. Implement the following visible surface detection algorithm and compare them on the basis of complexities and execution time. Z-buffer Scan-line Depth sorting Octree Ray Casting.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7E1 Big Data Analytics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To increase knowledge of the Big Data landscape.
2. Develop a comprehensive knowledge R, Hadoop and Spark for effective data analysis.
3. Develop skills in independent managing Big Data projects and related issues.
4. Develop ability to carry out research in area of Big Data Analytics.

Prerequisites: Some programming experience (in any language) is recommended.

COURSE CONTENTS

UNIT- I

Introduction to Big Data : Definition & importance of Big Data - Five Dimensions of Big Data - Volume, Velocity, Variety, Veracity, Valance – Industry examples – Terminologies – Structured Data, Unstructured Data, Semi Structured Data, Streaming Data, Real-Time Data, Meta Data, data at rest, Big Data Applications, Challenges Process of Data Analysis.

UNIT-II

Big Data analytics: Introduction – Concepts - Storing Big Data - Analyzing your data characteristics - Selecting data sources for Analysis - Eliminating Redundant Data - Open Source Technology for Big Data analytics - Predictive Analytics - Crowdsourcing Analytics - Computing Platforms, Limitations, and Emerging Technologies - Consumption of analytics - Modern Analytic Approaches – Ensemble Modeling, Commodity Models, and Text Analysis.

UNIT- III

Introduction to R: R-Environment Setup, Programming with R, Basic Data Types, Vectors, Creating and Naming Vectors, Vector Arithmetic, Introduction to Factors, Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Subsetting of Data Frames, Extending Data Frames, Sorting Data Frames, Creating a List: Creating a Named List, Accessing List Elements, Reading from CSV files, Writing to CSV file.

UNIT- IV

Introduction to Hadoop: Introduction to learning and knowledge analytics - Big Data From Technology Perspective – Hadoop - Components of Hadoop, Application Development in Hadoop, The Distributed File System - HDFS, GPFS, Hadoop Cluster Architecture, Batch Processing - Low Latency NoSQL.

UNIT- V

Introduction to Apache Spark: Resilient Distributed Datasets (RDDs), DataFrames & SparkSQL, Spark Operations, Spark Workflow, Python RDD API Examples, Broadcast Variables and Accumulators, Spark's Main Use Cases, Case Studies – Market Basket Analysis using R & Spark, Linear Regression using R & Spark.

Learning Outcomes:

Upon completing the course, students will be able to:

1. Apply Knowledge of Big Data to solve real world big data problems.
2. Understand the fundamentals of R, Hadoop, Spark programming.
3. Work on a real life Project, implementing R, Hadoop, Spark Analytics to create Business Insights.
4. Undergo into further research in Big Data.

BOOKS RECOMMENDED:

- [1.] Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Michael Minelli, Michele Chambers, Ambiga Dhira, Wiley India Pvt Ltd, 2013.
- [2.] R for Everyone: Advanced Analytics and Graphics, 1st Ed., Jared P. Lander, Pearson Education, Inc., 2014.
- [3.] Big Data Analytics with R and Hadoop, Vignesh Prajapati, Packt Publishing Ltd, 2013.
- [4.] Big Data Analytics: Turning Big Data into Big Money, Frank J. Ohlhorst, Wiley, 2012.
- [5.] Creating Value with Big Data Analytics: Making Smarter Marketing Decisions, Peter C. Verhoef, Edwin Kooge, Natasha Walk, Taylor & Francis, 2016.
- [6.] K Mark Gardener, Wrox Beginning R: The Statistical Programming Language.
- [7.] Y. anchang Zhao, R and Data Mining: Examples and Case Studies . Elsevier in December 2012.
- [8.] Alex Holmes, Hadoop in practice, Manning Publications, 2012
- [9.] Tom White, Hadoop, The definitive guide, O'Reilly Media, 2010

List of Practical Assignments: (If Applicable)

During the learning of course, students need to do assignments:

1. To learn the R Programming language.
2. To explore Rstudio for data Analysis problems.
3. To explore Hadoop for solving the Big data problems.
4. To explore Spark for analysing Big data problems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technology					
Subject Code & Name 4IT402 Artificial Intelligence	Periods Hours/ W Lectures- 4 Tutorials-0 Practical- 2	Marks	Th	CW	SW	Pr	Total
Duration of Theory Paper: 3 Hours		Max	100	50	50	50	250
		Min	35	25	25	25	110

Objective: To introduce the concepts of making computer systems intelligent through computational methods and techniques.

Course of Contents

Unit-I

AI and AI Techniques; Problems, Problem space and State space; Production systems; Search techniques and algorithms.

Unit-II

Knowledge Representation- Issues and Methods; Predicate logic- resolution and unification; Forward and backward Reasoning; Logic programming & Prolog.

Unit-III

Symbolic computation- Uncertainty; Rule based systems; Statistical Reasoning; Fuzzy Logic; Expert systems; ~~Decision support systems.~~

Unit-IV

Semantic networks; Frames and Scripts; Conceptual Dependency; Game playing; Planning overview; Understanding; Learning.

Unit-V

Natural language processing- parsing, semantic analysis, ATN and RTNs; Connectionist models- neural networks; Speech and vision processing; ~~Robotic actions.~~

Books Recommended:

- [1] E Rich, K Knight, Artificial Intelligence, 2/e, McGraw Hill, 1991.
- [2] S Russell, P Norvig, Artificial Intelligence: A Modern Approach, 2/e, Pearson Education (PH), 2003.
- [3] D W Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 2007.
- [4] P Winston, Artificial Intelligence, 3/e, Addison Wesley, 1992.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR7G5 Artificial Intelligence	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Learn the knowledge representation techniques, reasoning techniques and planning
Introduce the concepts of Expert Systems and machine learning.

Pre requisites: Data Structures and Algorithms Analysis of Algorithm

COURSE CONTENTS

UNIT-I

Introduction: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics Problem solving methods – Defining the problem as state space search, Problem graphs, Matching, Indexing and Heuristic functions.

UNIT-II

Search Techniques: Hill Climbing-Depth first and Breath first, heuristic search strategies-Best-first search, A*, AO* search, Constraints satisfaction, Means end analysis, simulated annealing, etc. Measure of performance and analysis of search algorithms. Adversarial search –Minimax search procedure, alpha-beta pruning, iterative deepening, genetic algorithms - Related algorithms, etc.

UNIT-III

Representation of Knowledge : Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge. Knowledge representation -Production based system, Frame based system, Scripts, CD, Ontologies, Sementic web and RDF.

UNIT-IV

Knowledge Inference and Planning: Inference – Backward chaining, forward chaining, Rule value approach, uncertain knowledge and reasoning: Probabilistic reasoning, Bayesian networks, Fuzzy logic and reasoning, Theory-Bayesian Network-Dempster - Shafer theory. Planning overview, components of planning system, Goal stack planning, Hierarchical planning, and other planning techniques.

UNIT-V

Machine Learning and Expert Systems: Overview of different forms of learning, Statistical methods, Learning Decision Trees, Neural Networks, Clustering- basic agglomerative, divisive algorithm based on similarity/dissimilarity measures. Introduction to Natural Language Processing. Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge. Typical expert systems - MYCIN, DART, XCON, Expert systems shells. Basic knowledge of Prolog programming language.

Learning Outcomes

- Upon completing the course, students will be able to:
- Familiar with Artificial Intelligence, its foundation and principles. Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications. Learn Prolog Programming to program intelligent systems.

BOOKS RECOMMENDED:

- Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill-2008.
- Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007 Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
- Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).
- <http://nptel.ac.in>.
- Carl Townsend, “Introduction to Turbo PROLOG”, BPB Publication.
- Ivan Bratko, “Prolog Programming for Artificial Intelligence”, 3rd Edition, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Information Technology)						
Subject Code & Name		Instructions Hours per week		Marks						
4IT404 Very Large Databases		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper 3 Hours		4	0	2	Ma	10	50	50	50	250
					x	0				
					Min	35	25	25	25	110

Objective: To provide knowledge of data warehouse & data mining tasks & techniques.

Prerequisite: Knowledge of Database Management System.

Course of Contents

UNIT -I

Introduction: Introduction to Data warehouse, OLTP, OLAP, Data Mining, Processes within data warehouse, Extraction, Loading, Cleaning, Transformation of data, Data warehouse, Multidimensional Model, Schemas for Multidimensional database, Defining Star, Snowflake and Fact Constellation. ~~Concept Hierarchy.~~

UNIT- II

Architecture : Design & Construction of Data Warehouses, Three- Tier Data Warehouse Architecture, ~~Data Mining Primitives, DMQL. Architecture of Data Mining System.~~

UNIT -III

Data Mining: Associations, Correlations & Cluster Analysis, Data mining techniques, Association rules mining, Apriori Algorithm, cluster analysis, Types of data in clustering analysis, categorization of major clustering methods.

UNIT- IV

Classification and Prediction: Issues regarding classification and prediction, Classification by decision tree induction, Bayesian classification, Rule-based classification, Classification by back-propagation, ~~Association Classification, Other classification methods, Prediction.~~

UNIT- V

Advanced Topics: ~~Web Mining, Web concept mining, Web structure mining, Web Usage mining. Spatial Mining, KDD Process.~~

Books Recommended:

- [1] Han and Kamber, Data Mining Concepts & Techniques, Morgan. Kaufman, India 2001.
- [2] Sam Anahory and Dennis Murray, Data Warehousing in the real World, Pearson Education Asia, 2000.
- [3] W. H. Inmon, Building the Data Warehouse, 4th Ed Wiley dreamtech India, 2005.
- [4] [Z. Markov](#), [Daniel T. Larose](#) Data Mining the Web, Jhon wiley & son, USA, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV B.E. (Information Technology)			
Subject Code & Name	Instructions Hours per Week			Credits			
ITR8E1	L	T	P	L	T	P	Total
Data warehousing and Mining	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To learn the latest development of Data warehousing & data mining concepts and techniques.
- To understand and apply theories and wide range of data mining algorithms.
- To develop skills for using recent data mining software, including WEKA, SPSS, or the R language to solve practical problems in a variety of disciplines.
- To develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

UNIT I

Data Warehouse: Introduction to Data Warehouse, Differences between OLAP and OLTP. Data Warehouse characteristics, Data Warehouse Architecture and its components, Extraction-Transformation-Loading, Data Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT II

Introduction to Data Mining: Introduction to Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing- Data Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of similarity and dissimilarity-Basics.

UNIT III

Classification: Problem definition, General Approaches to solving a classification problem, Issues regarding classification, Classification techniques, Decision trees-Decision Tree Construction, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes classification, Bayesian Rule-based classification, Classification by back-propagation.

UNIT IV

Association Rules: Introduction to Association Rule, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, ~~The Partition Algorithms, FP Growth Algorithms, Frequent Item Set Maximal Frequent Item Set, Closed Frequent Item Set.~~

UNIT V

Clustering: Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means **Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm-Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and weakness, Outlier Detection.**

RECOMMENDED BOOKS

- [1] Sam Anahory and Dennis Murray, Data Warehousing in the real World, Pearson Education Asia, 2000.
- [2] P. Tan, M. Steinback and V. Kumar, Introduction to Data Mining, Addison Wesley, Second Edition, 2016.
- [3] J. W. Han and M. Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, San Francisco, CA, Third Edition, 2011.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of Data Warehousing and various Data Mining Algorithm useful for solving the real world problems.

List of Assignment in Data Mining Lab:

- Problem based on different Data Mining algorithm
- Works on different Data Mining Algorithm
- Case Study on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technolog					
Subject Code & Name	Periods Hours/ Week	Marks	TH	CW	SW	Pr	Total
4IT451 Multimedia Computing	Lectures- 4	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hour	Tutorials-0 Practical- 0	Min	35	25	-	-	60

Objective: To give exposure to the students on latest development in the field of Multimedia and related fields.

Prerequisite: Computer Graphics and fundamentals of Information Theory.

Course of Contents

Unit-I

Multimedia: Introduction and Applications Components of multimedia, Fundamentals of Information theory, Multimedia Authoring tools, Basics of Data Compression: - Run-length, Huffman, Arithmetic, Dictionary based data compression.

Unit-II

Fundamentals of Image :Image and graphics: digital image representation and computer image processing, Half-toning, Dithering, Various image formats, Color Models, image compression standards JPEG, JPEG2000, JPEG-LS.

Unit-III

Basics of Digital Audio: Sound/Audio: basic Concepts, analysis & Transmission, MIDI concepts, Audio memory representation, Sound/Audio compression techniques: ADPCM, G.726 ADPCM, MP3.

Unit-IV

Basics of Video: Types of video signals, Analog video, Digital video, Basic Video compression techniques: H.261, H.263, MPEG1, MPEG2, MPEG4, MPEG7.

Unit-V

Multimedia Network Communication: Issues of Multimedia Communication, Data Transmission, Multimedia over IP and ATM network, Transportation of MPEG4, Media-on-Demand, Multimedia over Wireless Network,

Books Recommended:

1. Ralf Steinmetz & Klara Nahrstedt, Multimedia: Computing, Communications & Applications, Pearson Education Asia
2. Tay Vaughan, Multimedia: Making It Work, McGrawhill, Osborne Media
3. Jerry D. Gibson, Multimedia Communications, Directions and Innovations
4. J. Jeffcoate, Multimedia in practice, Technology & Application, PHI 1995.
5. Ze-Nian-Li, Fundamentals of Multimedia, Pearson Education
6. S. Annadurai & R. Shanmugalakshmi, Fundamentals of Digital Image Processing Pearson Education

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technology					
Subject Code & Name	Periods Hours/	Marks	Th	CW	SW	Pr	Total
4IT403 Enterprise Computing Techniques	Week Lectures- 4	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours	Tutorials-0 Practical- 2	Min	35	25	25	25	110

Objective: To understand the concepts of building enterprise-class distributed applications in Java.

Prerequisites: Programming in of Java, Basics of Server Side Programming in Java.

Course of Contents

Unit-I

RMI: Object serialization, Developing Applications with RMI, the RMI security manager, Parameters passing in RMI, Object serialization. JNDI: Naming services, Directory services, Benefits of JNDI, JNDI Architecture, JNDI concepts

Unit-II

Overview & EJB Fundamentals: Motivation for EJB, Component architecture, Various roles in J2EE architecture, Type of beans, Distributed object & Middleware, Constituents of enterprise beans: Enterprise beans class, EJB Object, Home object, Local interfaces, Remote Interfaces, Deployment descriptor, Vendor specific files.

Unit-III

Session Beans: Stateless session beans, Stateful session beans, characteristics of stateful session beans, life cycle diagram for session beans. JMS, Integrating JMS with EJB, Developing message driven beans.

Unit-IV

Entity Beans: Persistence concepts, Features of entity beans, Bean managed Persistent entity beans, Container managed persistent entity beans, Life cycle Diagrams of BMP entity bean and CMP entity bean.

Unit – V

Transactions: - Motivation for Transactions, The ACID properties, Transactional methods, Declarative, Programmatic, and client initiated transactions, Container Managed Transactions
BMP and CMP Relationships: - The CMP and BMP difference, Cardinality:-1:1 relationships, 1: N relationships and M: N relationships

Books Recommended:

1. Ed Roman “Mastering Enterprise JavaBeans”, Wiley Publishing, 3rd Edition,2005.
2. J2EE Tutorial from www.java.sun.com.
3. Kal Ahmed “Professional JAVA server programming”, SPD, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology		BE IV Year Information Technolog					
Subject Code & Name	Periods Hours/ Week	Marks	TH	CW	SW	Pr	Total
4IT405 Software Architecture	Lectures- 4	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hour	Tutorials-0 Practical- 0	Min	35	25	-	-	60

Objective: To give exposure to the students on latest development in the field of software architecture required for large scale applications.

Prerequisite: Nil.

Course of Contents

Unit - I

Software Architecture Terminology: Components, Relationship, Views, Styles, Layering, Frameworks, Patterns, Processes, Methodologies, Functional and Non-functional Properties of Software Architectures.

Unit – II

Techniques for evolving Software Architecture: Abstraction, Encapsulation, Information Hiding, Modularity, Separation of Concerns, Coupling and Cohesion, Sufficiency, Completeness and Primitiveness, Separation of Policy & Implementation, Separation of Interface and Implementation.

Unit- III

Architectural Styles: Pipes and Filters, Information Abstraction and Object-Oriented, Event-Based, Implicit Invocation, Layered Systems, Repositories, Interpreters, Heterogeneous Architectures.

Unit - IV

Software Architecture Implementation - Development environment facilities: code generation, Reverse Engineering, Forward Engineering, Profiling, Software libraries, Testing and Debugging.

Unit-V

Quality issues in software architecture: Changeability, Efficiency, Interoperability, Reliability, Testability, Reusability, Fault tolerant software.

Books Recommended:

- [1]M. Shaw: Software Architecture Perspectives on an Emerging Discipline, Prentice-Hall, 1996.
- [2]Len Bass, Paul Clements, Rick Kazman, Software Architecture in Practice, Pearson Education, 2002.

Academic Year: July-2016 to June-2017
 Programme: B.E (FT) II Branch : Mechanical Engineering

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	2AM101	Applied Mathematics-III	AMR3C1	APPLIED MATHEMATICS-III	0%
2	2ME102	Strength of Materials	MER3C2	STRENGTH OF MATERIAL	5%
3	2ME103	Material Science	MER3C3	MATERIAL SCIENCE	0%
4	2ME104	Manufacturing Processes	MER3C4	MANUFACTURING PROCESS	5%
5	2ME105	Applied Thermodynamics	MER3G1	APPLIED THERMODYNAMICS	5%
6			MER3L1	WORKSHOP / PRACTICAL (APP. THERMODYNAMICS)	100%
7	2SS106	Effective Communication Skills	SMR3S3	EFFECTIVE COMMUNICATION SKILL.	0%
8	2ME151	Multi disciplinary Engineering	MER4C1	INDUSTRIAL ENGG- & MANAGEMENT	5%
9	2ME152	Theory of Machines	MER4C2	THEORY OF MACHINE	0%
10	2ME153	Machine Design and Drawing	MER4C3	MACHIN. DESIGN & DRAWING	5%
11	2ME155	Fluid Mechanics	MER4G4	FLUID MECHANICS	0%
12	2ME154	Mechatronics	MER4G2	MECHATRONICS	0%
13			MER4L2	WORKSHOP / PRACTICAL (MECHATRONICS)	100%
14	2SS156	Engineering Economics	SMR4S4	ENGINEERING ECONOMICS	0%
Average % change in BE program = Total average / 4 =					Average % change =
					4.00%

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Academic Year: July-2017 to June-2018
 Programme: B.E (FT) III
 Branch : Mechanical Engineering

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	3ME101	Dynamics of Machine	MER5C1	Dynamics of Machine	5%
2	3ME102	Machine Design I	MER5C2	Machine Design I	5%
3	3ME103	Production Engineering	MER5G1	Production Engineering	0%
4	3ME104	I C Engines and Gas Turbines	MER3C4	I C Engines and Gas Turbines	5%
5	3ME105	Heat and Mass Transfer	MER5C3	Heat Transfer	20%
6	3SS106	Principles of Management	SMR5S5	Principles of Management	5%
7			MER5L3	WORKSHOP/PRACTICAL (Machine Design - I)	100%
8	3ME152	Machine Design II	MER6C1	Machine Design II	5%
9	3ME153	Production Engineering II	MER6C2	Production Engineering II	5%
9	3ME154	Fluid Machines	MER6C3	Fluid Machines	0%
10	3ME155	Energy Conversion Systems	MER6C4	Energy Conversion Systems	0%
11			MER6G1	Materials Management	100%
12	3SS156	Entrepreneurship Development & IPR	SMR6S6	Entrepreneurship Development & IPR	0%
13	3ME151	Customer Relations Management			
14			MER6L4	WORKSHOP/PRACTICAL(Machine Design - II)	100%
Average % change in BE program = Total average / 4 =					25%
Average % change =					6.25%

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Academic Year: July-2018 to June-2019
 Programme: B.E. (FT) IV
 Branch : Mechanical Engineering

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	4ME101	Operations Research	MER7C1	Operations Research	5%
2	4ME102	Machine Design III	MER7C2	Machine Design III	5%
3	4ME103	Refrigeration & Air Conditioning	MER7C3	Refrigeration & Air Conditioning	5%
4		Elective - I	MER7E1	Elective - I	0%
5	4ME110	Project Phase-I	MER7P1	Project Phase-I	0%
6	4ME104	SQC & TQM	MER7E1	SQC & TQM	5%
7	4ME105	Artificial Intelligence	MER7E2	Artificial Intelligence	0%
8	4ME106	Robotics	MER7E3	Robotics	0%
9	4ME107	Tribology	MER7E4	Tribology	0%
10	4ME108	Computational Fluid Dynamics	MER7E5	Computational Fluid Dynamics	0%
11	4ME151	Production & Operations Management	MER8C1	Production & Operations Management	10%
12	4ME153	Vibration & Noise Control	MER8C2	Vibration & Noise Control	5%
13	4ME156	Automobile Engineering	MER8C3	Automobile Engineering	0%
14		Elective - II	MER8E1	Elective - II	0%
15	4ME160	Project Phase-II	MER8P1	Project Phase-II	0%
16	4ME152	CAD/CAM	MER8E1	CAD/CAM	5%
17	4ME154	Reliability Engineering	MER8E2	Reliability Engineering	0%
18	4ME155	Product Development	MER8E3	Product Development	0%
19	4ME157	Non Conventional Sources of Energy			
20			MER8E4	Power Plant Engineering	5%
21	4ME158	Gas Dynamics	MER8E5	Gas Dynamics	0%
22			INR8C1	INTERNSHIP	100%
23			INR8E1	ELECTIVE - I (FROM SVYAM PORTAL)	100%
24			INR8E2	ELECTIVE - II (FROM SVYAM PORTAL)	100%
Average % change in BE program = Total average / 4 =					3.75%
Average % change =					15%

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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2AM101 APPLIED MATHEMATICS- III	L	T	P		TH	CW	SW	PR	Total
	4	0	0	Max	100	50			150
Duration of Theory Paper: 3 Hours				Min	35	25			60

Objective of the subject:

The course aims at developing the Laplace Transform methods, useful in problems where mechanical/electrical driving force has discontinuities, is impulsive or is a complicated periodic function, fundamentals of Complex Analysis, applicable to potential theory useful in steady state conduction, electrostatic and gravitational fields, and the most basic Numerical Methods and concepts like error estimation, order of convergence, stability etc. Software like Matlab, MathCAD, Mathematica etc. can be used to simulate the results of various numerical methods.

Prerequisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and complex numbers.

COURSE OF CONTENTS

UNIT 1:

Laplace transform: Definition and properties of Laplace transform, Inverse Laplace Transforms. Convolution theorem.

Application of Laplace transform in solution of ordinary differential equations:

Solution of ordinary differential equations with constant and variable coefficients. Simultaneous differential equations with constant coefficients.

UNIT-2 :

Function of Complex variables: Analytic functions, Cauchy-Riemann conditions, Harmonic functions, Conjugate functions and their applications.

Complex integral: Integration of complex functions, simply and multiply connected regions, Cauchy's integral theorem, Cauchy's integral formula, Singularities, Zeroes, Residues and Residue theorem.

UNIT-3

Numerical solutions of algebraic and transcendental equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Direct iterative method, Graffe's root squaring method.

Solution of system of linear algebraic equation: Matrix inversion method, Gauss- elimination Method, Jordan's method, Crout's method. Gauss-Seidel iterative method

UNIT-4

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals. Divided differences and central differences.

Numerical differentiation and integration: Differentiation using forward, backward and divided difference General quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule.

UNIT-5

Numerical solution of ordinary differential equation: - solution by Euler's, method Euler' Modified method Taylor's series. Picard's successive approximation method. Runge-kutta method. Milne's Predictors and Correctors method. Numerov's methods

Numerical solution of partial differential equation: Classification of second order Partial differential equation. Integration of elliptic, parabolic and hyperbolic equations by Iteration method. Method of Crank-Nicolson for space time problems.

RECOMMENDED BOOKS:

- [1] Francis J. Scheid, *Schaum's Outline of Numerical Analysis*, McGraw-Hill, New York, 1989.
- [2] Gupta P.P.& Malik G.S., *Calculus of Finite Differences and Numerical Analysis*, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
- [3] B.S.Grewal, *Engineering Mathematics*, Khanna Publishers, 12/e, 2006.
- [4] S. S. Sastry, *Engineering Mathematics*, Vol I,II Prentice Hall Publication, 3/e, 2004.
- [5] Murray R. Spiegel, *Schaum's Outline of Complex Variables*, McGraw-Hill, NewYork, 1968.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
AMR3C1: APPLIED MATHEMATICS-III	L	T	P	L	T	P	Total
	Duration of Theory Paper: 3 Hours	3	1	-	3	1	-

Learning Objectives:

- To develop an understanding of the underlying mathematics as a preparation for a specialist study of applications areas like, Laplace transform to solve the diffusion equation, heat transfer equation, mass transport, heat transport, fluid transport, and process controls; Complex Analysis in fluid mechanics and potential theory useful in steady state conduction, electrostatic and gravitational fields; Fourier analysis relevant for PDE-solving and probably the heat equation in three dimensions. Vibration sensitive instruments with Fourier transformers attached can be used for tuning pianos and motor engines, for aircraft and submarine detection and so on.
- Numerical approach enables solution of a complex problem with a great number of very simple operations. It is useful to find the solution with use of computers making calculation easy and fast.

Pre requisite(s): Basic knowledge of determinants, matrices, differentiation and integration of functions and complex numbers.

COURSE CONTENTS

UNIT-I

Laplace transform: Definition and properties of Laplace transform, Inverse Laplace Transforms. Convolution theorem, Application of Laplace transform in solution of ordinary differential equations, Simultaneous differential equations with constant coefficients.

UNIT-II

Function of Complex variables: Analytic functions, Cauchy-Riemann conditions, Harmonic functions, Conjugate functions and their applications, Cauchy's integral theorem, Cauchy's integral formula, Taylor's and Laurent' series, Residue theorem, Solution of integrals, Conformal transformation, bilinear transformation, their properties and classification.

UNIT-III

Numerical solutions of algebraic and transcendental equations-Bisection method, Regula-Falsi method, Newton-Raphson method.

Solution of system of linear algebraic equation-Iterative methods: Gauss-Seidel and Gauss-Jacobi's iterative methods.

Numerical Solutions of ordinary differential equations - Single and multi-step methods.

Numerical solution of partial differential equation: Classification of second order Partial differential equation, Solution of elliptic, parabolic and hyperbolic equations by Iteration method.

UNIT-IV

Interpolation: Finite difference operator, Interpolation formula with equal and unequal intervals, Numerical differentiation, General quadrature formula, Numerical integration using Trapezoidal rule, Simpson's $1/3^{\text{rd}}$ rule, Simpson's $3/8^{\text{th}}$ rule, Weddle's rule.

UNIT-V

Fourier series, Fourier Integral, Fourier transforms, Finite Fourier sine and cosine transform, Parseval's theorem, continuous time and discrete time Fourier Transform, DFT and FFT, solution of partial differential equations with constant and variable coefficients.

Learning Outcomes:

Upon completing the course, students will be able to:

- 1) Apply Laplace Transform methods, useful in problems where mechanical/electrical driving force has discontinuities, is impulsive or is a complicated periodic function.
- 2) The course aims at developing the fundamentals of Complex Analysis, applicable to potential theory useful in steady state conduction, electrostatic and gravitational fields.
- 3) Apply Fourier Theory to analyze the quality of signals, how crosstalk, interference, noise, and distortion affect signal quality and to extract information from noisy signals.
- 4) Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equation, numerical methods work very well.

BOOKS RECOMMENDED:

1. B.S. Grewal, Engineering Mathematics, Khanna Publishers, 42/e, 2015.
 2. Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Wiley and sons Publications, 1999.
 3. Gupta P.P. & Malik G.S., Calculus of Finite Differences and Numerical Analysis, Krishna Prakashan Mandir, Meerut, 21/e, 2006.
 4. Kasana H.S., Complex Variables: Theory and Applications, Prentice-Hall of India Pvt. Ltd, 2nd edition, 2005.
 5. A.R. Vasishtha and R.K. Gupta, Integral Transforms, Krishna Prakashan Media Ltd, Meerut, India, 2000.
 6. Murray R. Spiegel, Schaum's Outline of Fourier Analysis, McGraw-Hill, New York, 2004.
 7. J. F. James, A Student's Guide to Fourier Transforms with Applications in Physics and Engineering, 3rd Edition, Cambridge University Press, 2011.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year PTDC (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2MEP102 STRENGTH OF MATERIAL	L	T	P		TH	CW	SW	PR	Total
	3	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

With this subject the beginning of a Mechanical engineering starts for the II year Mechanical Engineering students. The subjects introduce the students about the mechanics of a material by introducing the terms stress and strain. It gives an idea of behavior of a material comes under the different loading like tensile, compression, shear and torsion. The subject also covers the theory used in designing of column and struts.

COURSE OF CONTENTS

UNIT-1

Stress and strain

Tensile, compressive and shear stresses, complimentary shear stresses with varying cross section, Temperature stresses, Modulus of Elasticity. Modulus of rigidity, Bulk modulus, Poisson's ratio, Relations between the three moduli, Stress on oblique Section of a bar subjected to axial stress, Compound stresses, Principle stresses & strain, Mohr's circle of stresses and strain.

Elastic strain energy, Different type of loading, Resilience, Proof resilience, Strain energy in Tensile, Static, Sudden falling, Gradually applied and Impact loading. Strain energy due to shear stresses.

UNIT-2

Shear force and Bending moment of Beams

Beams, Classification of beams, Types of loading, span, Shear force and Bending moment, Relation between load, shear force and bending moment, shear force and bending moment diagram for cantilever and simply supported beam with concentrated load, Point load, uniformly distributed load, gradually varying load, Eccentric point load.

UNIT-3

Bending stresses & Deflection of Beams

Introduction, Pure Bending, Simple Bending theory, Expression for Bending Stress, Moment of inertia of section, Bending Stresses in Symmetrical Section, Shearing stresses in Beams, Distribution of shearing stress in different sections..

Slope & Deflection of Beam subjected to Uniform Bending Moment, Relation between Slope, Deflection and Radius of Curvature, Deflection of simply supported beam carrying a point load and uniform distributed load, Macaulay's Method and Moment Area Method for finding out deflection of beam.

UNIT-4

Torsion of Circular shaft

Introduction, Pure Torsion, Torsional stress & strain in circular shafts, Polar moment of Inertia, Torsional moment of resistance, Torsion equation of circular shaft, Power transmitted by shaft, composite shaft, Strength of shaft, Torsional shear stress in shaft, Shaft of varying section.

UNIT-5

Columns & Struts

Introduction, Classification of column, Failure of column Euler's theory for column, End conditions of column and struts, Equivalent length of column, Calculation of equivalent length for different end conditions of column, Slenderness ratio, limitations of Euler's formula, Rankin's formula for long column and eccentric loading. Formula for Indian standard code of practice.

BOOKS RECOMMENDED

- [1] Warnock Ramamurtham, *Strength of Materials*, Dhanpat Rai Publications, 1998
- [2] Bansal R K, *Strength of Materials*, 4/e, Laxmi Publications (P) Ltd, 2007
- [3] Popov *Mechanics of Solids*, 2/e, Pearson Education (India),
- [4] Timoshenko, *Elements of Strength of Materials*, 5/e, Wadsworth Publishing; 1968

LABORATORY EXPERIMENTS:

1. Performance of Tensile test to obtain Tensile properties of the material
2. Performance of Tensile test to obtain Stress-Strain curve
3. Performance of Compressive test to obtain Compressive properties of the material.
4. Performance of Shear test to obtain Shear properties of the material
5. Performance of Bending test to obtain Bending properties of the material.
6. Performance of Brinell Hardness Test.
7. Performance of Vickers Hardness Test.
8. Performance of Torsion test to obtain torsional properties of the material.
9. Performance of Torsion test to obtain T- θ Curve
10. Performance of Impact test to obtain Impact Strength of the materials.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C2 STRENGTH OF MATERIALS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To provide the knowledge of Strength/Load Bearing capacity of Different Materials.
- 2) To give basic concepts of different types of stresses & strain/ Mechanics of Material.
- 3) To develop skill to analyze the distribution of stresses in material.
- 4) To know how to find the Torsional stresses and Beam strength of column.

Pre requisite(s): Engineering Physics, Engineering Mathematics

COURSE CONTENTS

UNIT-I

Stress and strain: Tensile, compressive and shear stresses, complimentary shear stresses with varying cross section, Temperature stresses, Modulus of Elasticity. Modulus of rigidity, Bulk modulus, Poisson's ratio, Relations between the three moduli, Stress on oblique Section of a bar subjected to axial stress, Compound stresses, Principle stresses & strain, Mohr's circle of stresses and strain.

Elastic strain energy, Different type of loading, Resilience, Proof resilience, Strain energy in Tensile, Static, Sudden falling, gradually applied and Impact loading. Strain energy due to shear stresses.

UNIT-II

Shear force and Bending moment of Beams: Beams, Classification of beams, Types of loading, span, Shear force and Bending moment, Relation between load, shear force and bending moment, shear force and bending moment diagram for cantilever and simply supported beam with concentrated load, Point load, uniformly distributed load, gradually varying load, Eccentric point load.

UNIT-III

Bending stresses & Deflection of Beams: Introduction, Pure Bending, Simple Bending theory, Expression for Bending Stress, Moment of inertia of section, Bending Stresses in Symmetrical Section, Shearing stresses in Beams, Distribution of shearing stress in different sections..

Slope & Deflection of Beam subjected to Uniform Bending Moment, Relation between Slope, Deflection and Radius of Curvature, Deflection of simply supported beam carrying a point load and uniform distributed load, Macaulay's Method and Moment Area Method for finding out deflection of beam.

UNIT-IV

Torsion of Circular shaft: Introduction, Pure Torsion, Torsional stress & strain in circular shafts, Polar moment of Inertia, Torsional moment of resistance, Torsion equation of circular shaft, Power transmitted by shaft, composite shaft, Strength of shaft, Torsional shear stress in shaft, Shaft of varying section.

UNIT-V

Columns & Struts: Introduction, Classification of column, Failure of column Euler's theory for column, End conditions of column and struts, Equivalent length of column, Calculation of equivalent length for different end conditions of column, Slenderness ratio, limitations of Euler's formula, Rankin's formula for long column and eccentric loading. Formula for Indian standard code of practice.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 5) Learn behavior of different material under different types of loading.
- 6) To understand the basic concepts of Principal Stress & Strain.
- 7) Learn basic fundamentals used in Designing a Mechanical Component.
- 8) Design the column & struts used in Mechanical as well as Civil Engineering.

BOOKS RECOMMENDED:

- [1] Warnock Ramamurtham, *Strength of Materials*, 16/e, Dhanpat Rai Publications, 2011
- [2] Bansal R K, *Strength of Materials*, 4/e, Laxmi Publications(P) Ltd, 2012
- [3] Popov *Mechanics of Solids*, 2/e, Pearson Education (India), 1998
- [4] Timoshenko, *Elements of Strength of Materials*, 3/e, Wadsworth Publishing; 2004

LIST OF PRACTICAL ASSIGNMENT

11. Performance of Tensile test to obtained tensile properties of the material.
12. Performance of Tensile test to obtained Stress-Strain curve for Different Material.
13. Performance of Compressive test to obtained Compressive properties of the material.
14. Performance of Shear test to obtained Shear properties of the material.
15. Performance of Bending test to obtained Bending properties of the material.
16. Performance of Brinell hardness Test.
17. Performance of Vickers Hardness Test.
18. Performance of Torsion test to obtained torsional properties of the material.
19. Performance of Torsion test to obtained T- θ Curve.
20. Performance of Impact test to obtained Impact Strength of the materials.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME103 MATERIAL SCIENCE	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

COURSE OF CONTENTS

Objective of the subject:

The objective of the subject to introduce the students about the different materials used in the engineering applications and study of different mechanical properties and performance of the materials. The pre requisites is Engineering Chemistry.

UNIT-1

Ferrous and Non-Ferrous Metals and Alloys:

Properties and application of various steels and cast iron. Effect of impurities, in ferrous metals. Effect of common alloying elements on the steels, High speed steels, Stainless steel, Other steel. Corrosion and its prevention. Composition, microstructure, properties and applications of Aluminium and its principle alloys, Copper and its principle alloys, Nickel and its principle alloys.

UNIT-2

Mechanical Properties & Equilibrium Diagram:

Various mechanical properties like strength, stiffness, elasticity, plasticity, ductility, hardness, impact strength, malleability, brittleness, toughness, resilience, etc Allotropy structure of alloys, lever rule, phase rule, Various types of phase diagrams. Cooling curves, Iron carbon equilibrium diagram . TTT diagrams.

UNIT-3

Heat Treatment of Metals and Alloys and Powder metallurgy:

Heat treatment procedure for steel hardening, harden ability, Surface hardening of steel, Defects in heat treated parts. Strengthening mechanisms. Manufacturing of metal powders. Sintering and secondary operations. Projects of finished parts. Design considerations and applications. Composite materials.

UNIT-4

Destructive and Non-Destructive Testings:

Tensile, compression, shear, torsion fatigue, impact, hardness tests. Ultrasonic, magnetic, eddy current, radiography tests etc. Metallography. Introduction to instrumental methods of analysis.

UNIT-5

Discription of Crystal Structure and Dislocation:

Seven Crystal System. Bravais lattice. Symmetry and properties of simple crystal structure Millers indices. Direction and planes indices. Edge Dislocation, Screw dislocations slip planes. ~~Stress fields of dislocation. Grain Boundaries. Dislocation Densities.~~ Strength of alloys. Dislocations and crystal growth.

BOOKS RECOMMENDED

- [1] Khanna, O.,P., *Material Science and Metallurgy*, Dhanpat Rai Publications, 2005
- [2] Nayak, S.,P., *Engineering Metallurgy & Material Science*, Charotara Publications, 2000
- [3] Narang., *Material Science*, Khanna Publisher-2000
- [4] Singh, I. P., *Material Science and Engineering*, Jain Brothers-2003

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C3 MATERIAL SCIENCE	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 5) To render the information that involves investigating the relationship that exists between the structures and properties of materials.
- 6) To provide the knowledge of Engineering Materials.
- 7) To give basic concepts of Material properties in terms of their utilization in machine design.
- 8) To provide the knowledge about testing of materials.

Pre requisite(s): Engineering chemistry, Engineering Physics.

COURSE CONTENTS

UNIT-I

Description of Crystal Structure and Imperfections in metal crystals :Review of crystal structure :Seven Crystal System. Bravais lattice. Symmetry and properties of simple crystal structure, Millers indices. Imperfections in metal crystals, Point Defects, Edge Dislocation, Screw dislocations slip planes.

UNIT-II

Ferrous and Non-Ferrous Metals and Alloys :Properties and application of various steels and cast iron. Effect of impurities, in ferrous metals. Effect of common alloying elements on the steels, High speed steels, Stainless steel, Other steel. Corrosion and its prevention. Composition, microstructure, properties and applications of Aluminum and its principle alloys, Copper and its principle alloys, Nickel and its principle alloys.

UNIT-III

Concept of Phase Diagrams and Equilibrium Diagrams : Iron Allotropy, cooling curves, phase diagrams, Gibbs phase rule, Various types of phase diagrams, Interpretation of Phase diagrams, Iron carbon equilibrium diagram, Classification of Equilibrium Diagrams: Eutectic, Eutectoid and Peritectic transformation, Iron carbon equilibrium diagram, TTT diagrams, Comparison of Iron carbon equilibrium diagram and TTT diagrams.

UNIT-IV

Heat Treatment of Metals and Alloys and Powder metallurgy :Classification of Heat treatment processes, Surface or case hardening of steel, Defects in heat treated parts. Manufacturing of metal powders. Sintering and secondary operations. Design considerations and applications.

UNIT-V

Metallography , Destructive and Non-Destructive Testing : Introduction to Metallography, Study of sample preparation and metallurgical Microscope. Study of Mechanical Properties and their significance in Engineering Applications, Classification of testing of materials, Tensile, Compression, Bend, Torsion, Fatigue, Impact, Hardness, Creep Tests, Ultrasonic, Magnetic, Radiography Tests etc.

Learning Outcomes :

After Completing the Course, Student will be able to:

- 9) Have the knowledge of materials.

- 10) Understand the mechanical properties of materials.
- 11) Know about the development of new materials having comparable properties.
- 12) Consider the “cradle-to-grave” life cycle of materials relative to machine design and manufacturing processes.

BOOKS RECOMMENDED:

- [1] Callister W.D.Jr., Materials Science and Engineering an Introduction, Wiley Publications(P) Ltd,2004.
- [2] Askeland D. R.,Fulay,P.P., Essentials of Materials Science and Engineering, Cengage Learning Publications,2010
- [3]Raghavan, V.,Materials Science and Engineering, Prentice-Hall of India (P) Ltd.,2001.
- [4] Khanna, O.,P., Material Science and Metallurgy,Dhanpat Rai Publications,2005

LIST OF PRACTICAL ASSIGNMENT

1. Performance of hardness test of ferrous materials using Rock Well hardness testing machine
2. Performance of magnetic particle crack detection to detect the cracks
3. Performance of impact test on a plastic test sample to detect impact strength of material.
4. Performance of crack detection using ultrasonic crack detector.
5. Study and perform steps involved in sample preparation for observing the microstructure under metallurgical microscope
6. Study and perform various heat treatment process using muffle furnace
7. Study of construction and function of metallurgical microscope.
8. Study of microstructures of ferrous metal alloys
9. Study of iron carbon diagram
10. Study of T.T.T. diagram

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II BE (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME104 Manufacturing Processes	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

To provide understanding about different manufacturing operations along with practical exposure of manufacturing processes.

COURSE OF CONTENTS

Unit-1

Production of Axisymmetric Parts

Introduction to Turning and related processes, turning parameters, constructional features and operation of turning and related machine tools: Lathes, Capstan-Turret lathes, Automats, CNC lathes, Machining centers and Turning centers. Single point cutting tools: types and geometry.

Unit-2

Production of Prismatic Parts

Fundamentals of Shaping, Planning and Milling processes, constructional features and operation of Shaper, Planner, Slotter and Milling machines, tool holding, work holding and indexing methods. ~~Types of milling cutters.~~

Unit-3

Drilling, Broaching, Screw Thread and Gear cutting

Introduction to operations like Drilling, Boring, Reaming, Counter Boring and Counter Sinking. Cutting tools, tool holding and work holding devices. Machine Tools for drilling and related hole making processes, accuracy and finish of drilled holes, Broaching process and Broaching machines, power calculations. Geometry of multipoint cutting tools like drill, reamer, broach and taps.

Types of Threads, External and Internal thread cutting processes. Gear: Types and Methods of Gear manufacturing.

Unit-4

Abrasive Machining

~~Introduction,~~ types of abrasives and bonds, marking system for grinding wheels and their selection criteria, mechanics of grinding, truing and dressing of grinding wheels, grinding machines for cylindrical and surface grinding, tool & cutter grinders. Safety in grinding, other abrasive processes: Honing, Lapping, Super finishing, Polishing and Buffing.

Unit-5

Metrology

Limits, tolerances and fits: Need for limit systems, interchangeability, statistical assembly, selective assembly, limit system. Taylor's principles of gauge design, gauge tolerance and wear allowances, types of limit gauges, thread or screw gauges, advantages & limitation of limit gauges. Measurement and inspection of external screw threads and gears.

BOOKS RECOMMENDED

- [1] ~~DeGarmo E. Paul, Materials and Processes in Manufacturing, Pearson Education.~~
- [2] Sharma P. C., *Production Technology, Production Engineering*, S.Chand and Co.
- [3] HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd.
- [4] Chapman W.A.J., *Workshop Technology Part 1, 2 and 3, 4ed*, Viva Books Private Ltd.

LABORATORY EXPERIMENTS

1. Study of geometry of single point cutting tools.
2. Study of geometry of milling cutters.
3. Study of geometry of double fluted twist drill.
4. Study of geometry of Taps and Reamer.
5. Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
6. Study of constructional features of the Shaper and to machine a job as per given dimensions on it.
7. Study of constructional features of the Milling m/c and to machine a job as per given dimensions on it.
8. Study of constructional features of the CNC lathe.
9. Study of comparators.
10. Measurement and inspection of screw threads and cutting tools using a Tool Makers Microscope and Profile Projector.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER3C4 MANUFACTURING PROCESSES	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

- 1) To provide an understanding of the various processes which are used extensively in the manufacturing of mechanical components.
- 2) To learn about the constructional features of the standard types of machine tools used in shop floor
- 3) To learn about the process parameters and the standard tooling used on various machine tools.
- 4) To learn about the basic measurement and inspection tools used in shop floor.

Pre requisite(s): Elements of Mechanical Engineering, Workshop Practice

COURSE CONTENTS

UNIT-I

Production of Axi-symmetric Parts: Introduction to the mechanics of metal cutting, Turning and related processes, Turning parameters, Constructional features and operation of turning and related machine tools: Lathes, Capstan-Turret lathes, Automats, CNC lathes, Machining centers and Turning centers. Single point cutting tools: types and geometry, Tool Materials.

UNIT-II

Production of Prismatic Parts: Introduction to the Shaping, Planning and Milling processes and their process parameters, Constructional features and operation of Shaper, Planner, Slotter and Milling machines, Tool holding, Work holding and Indexing methods, Cutting tools: types and geometry.

UNIT-III

Drilling, Broaching, Screw Thread and Gear cutting: Introduction to operations like Drilling, Boring, Reaming, Counter Boring and Counter Sinking. Machine Tools for drilling and related hole making processes, Drilling machine accessories, Process parameters for drilling and boring operations, Accuracy and finish of drilled holes, Broaching processes and broaching machines, power calculations. Cutting tools like drills, reamer, broach and taps: types and geometry. Thread forms and thread fits, External and Internal thread cutting processes. Gear: types and methods of gear manufacturing, Machine tools and tooling used for gear manufacturing.

UNIT-IV

Abrasive Machining: Introduction to various grinding operations, Types of abrasives and bonds, Marking system for grinding wheels and their selection criteria, Mechanics of grinding, Truing and dressing of grinding wheels, Grinding machines for cylindrical and surface grinding, Tool & cutter grinders. Safety in grinding, Other abrasive processes: Honing, Lapping, Super finishing, Polishing and Buffing.

UNIT-V

Metrology: Basic measurements and the use of Squares and Surface Plates, Micrometers, Vernier Calipers, Gage blocks, Inside, Depth and Height measuring instruments, Angular measurements, Limits, tolerances and fits: Need for limit systems, Interchangeability, Statistical assembly, Selective assembly, Limit system. Taylor's principles of gauge design, Gauge tolerance and wear allowances, Types of limit gauges, Thread or screw gauges, Advantages & limitation of limit gauges. Measurement and inspection of external screw threads and gears.

Learning Outcomes :

Upon Completing the Course, Student will able to:

- 1) Identify the processes used for the manufacturing of components of various sizes and shapes.
- 2) Understand the construction and working of the machine tools used for various operations along with the hands on experience of some of them during laboratory work.
- 3) Select the tooling and the process parameters for the processing of common engineering work materials.
- 4) Understand the use of basic measurement and inspection tools used in shop floor, recognize and design the three types of plug and ring gauges based on the limit system.

BOOKS RECOMMENDED:

- [1] Gupta I.C., *A Textbook of Engineering Metrology*, 7ed, Dhanpat Rai Publications.
- [2] Sharma P. C., *Production Technology, Production Engineering*, S. Chand and Co.
- [3] HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd.
- [4] Chapman W.A.J., *Workshop Technology Part 1, 2 and 3*, 4ed, Viva Books Private Ltd.
- [5] Hajra Choudhury A.K., Hajra Choudhury S.K., Roy Nirjhar *Elements of Workshop Technology : Machine Tools* (Volume - 2), Media Promoters and Publishers Pvt. Ltd.

List of Practical Assignment:

- 1) Study of the geometry of single point cutting tools.
- 2) Study of the geometry of milling cutters.
- 3) Study of the geometry of double fluted twist drill.
- 4) Study of the geometry of Taps and Reamer.
- 5) Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
- 6) Study of constructional features of the Shaper and to machine a job as per given dimensions on it.
- 7) Study of constructional features of the Milling m/c and to machine a job as per given dimensions on it.
- 8) To study the indexing of workparts, to be milled, using a dividing head.
- 9) Study of comparators.
- 10) Measurement and inspection of screw threads and cutting tools using a Tool Makers Microscope and Profile Projector.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME105 APPLIED THERMODYNAMICS	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

To make a fundamentally strong base to design Thermal System. Pre requisites is Elements of Mechanical Engineering

COURSE OF CONTENTS

UNIT-1:

Second Law of Thermodynamics:

~~Qualitative difference between Heat and Work~~, Cyclic Heat Engine, Kelvin-Planck statement, Clausius' statement, ~~Refrigerator and Heat pump~~, Equivalence of Kelvin-Planck and Clausius' statement, Reversibility and Irreversibility, Carnot's Theorem, Corollary of Carnot's theorem, Absolute thermodynamic temperature scale.

UNIT-2:

Entropy:

Introduction, Clausius' theorem, Property of Entropy, Entropy principle and applications, ~~Entropy generation in Closed system~~, Entropy transfer with heat flow, Entropy and disorder, Absolute entropy, ~~Postulatory thermodynamics~~.

UNIT-3:

Exergy:

~~Introduction~~, Available energy, Quality of energy, Maximum work in a reversible process, ~~Reversible work by an open system exchanging heat with the surroundings~~, useful work, Dead state, Availability.

UNIT-4:

Thermodynamic Relations:

Mathematical theorems, Maxwell's equations, Tds Equations, Difference in heat capacities, Ratio of heat capacities, Energy equation, Joule-Kelvin effect, ~~Evaluation of thermodynamic properties~~, ~~General thermodynamic considerations~~.

UNIT-5:

Compressors:

~~Introduction~~, ~~Types of compressors~~, Compression Processes, Work done in compression, Single stage Reciprocating air compressor, Volumetric efficiency, Multi-stage compression, ~~Advantages of Multi staging~~, ~~Air motors~~, ~~Introduction to Rotary compressors~~.

RECOMMENDED BOOKS

- [1] P.K. Nag, *Engineering Thermodynamics*, Tata McGraw-Hill Co, 2005
- [2] Y.A. Centgel, *Thermodynamics- An Engineering Approach*, Tata McGraw-Hill Co, 2003.
- [3] R. Yadav, *Thermodynamics and Heat Engines*, Central Publishing House, 2002.
- [4] G. E. Myers, *Engineering Thermodynamics*, Prentice Hall Englewood Cliffs, 1989.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE II Year (Mechanical Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER3G1 APPLIED THERMODYNAMICS	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The basic objectives of the subject are:

1. To understand fundamentals of thermal systems and their processes.
2. To understand the engineering applications of thermodynamics

Prerequisite(s): Engineering Physics and Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT- I

Second Law of Thermodynamics: Cyclic Heat Engine, Kelvin Planck Statement, Clausius Statement, Equivalence of Kelvin Planck and Clausius Statements, Reversibility and Irreversibility, Carnot Cycle, Carnot's Theorem, Absolute Thermodynamic Temperature Scale, Efficiency of the Reversible Heat Engine, Illustrative Problems .

UNIT- II

Entropy: Introduction, Clausius Theorem, Property of Entropy, Inequality of Clausius, Entropy change in an Irreversible Processes, Entropy Principle, Applications of Entropy Principle, Entropy Transfer with Heat Flow, Entropy and Disorder, Absolute Entropy Illustrative Problems .

UNIT- III

Fuels and Combustion: Introduction, Classifications of fuels, Combustion Equations, Theoretical Air and Excess Air, Stoichiometric Air-Fuel Ratio, Weight of Carbon in Flue Gases, Weight of Flue Gases per kg of Fuel Burnt, Analysis of Exhaust and Flue Gases .

UNIT-IV

Thermodynamic Relations: Mathematical Theorems, Maxwell's Equations, TdS Equations, Difference in Heat Capacities, Ratio of Heat Capacities, Energy Equation, Joule-Kelvin Effect, Illustrative Problems.

UNIT- V

Gas Compressors: Compression Processes, Work of Compression, Single Stage Reciprocating Air Compressor, Volumetric Efficiency, Multi Stage Compression, Illustrative Problems .

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- 1) Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
- 2) To understand the basic concepts of heat transfer and work transfer involved in the process.
- 3) Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

BOOKS RECOMMENDED :

- [1] Yunus A Cengel, *Thermodynamics-An Engineering Approach*, Tata Mc-Graw Hill Publishing House, New Delhi, V Edition.
- [2] Sonntag R E, Van Wylen G J, Borgnakke C, *Fundamentals of Thermodynamics*, John Wiley & Sons Pte Limited , Singapore, V Edition.
- [3] Nag P K ,*Engineering Thermodynamics*, Tata Mc-Graw Hill, New Delhi, V Edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4L2 Workshop/Practical (MECHATRONICS)	L	T	P	L	T	P	Total
	-	-	2	0	0	1	1
Duration of Theory Paper: 0 Hrs.							

Learning Objectives:

1. To learn about the construction and working of a variety of sensors/transducers used in mechatronic applications.
2. To learn about the actuation and control of mechatronic systems using hydraulic and pneumatic methods.
3. To learn about the construction and working of mechatronic systems used in a day-to-day lives.

Pre requisite(s): Basic course in electrical and electronic devices along with the concepts of digital electronics.

Learning Outcomes:

Upon completing the course, student will able to:

1. Acquire the basic understanding of the characteristics of various sensors and transducers used in mechatronic and measurement systems.
2. Select the suitable devices and arrange them in the circuit for the control of actuators using hydraulic and pneumatic means.
3. Acquire the basic understanding of common mechatronic systems.

LIST OF PRACTICAL ASSIGNMENT

1. Study of electrical resistance strain gauges.
2. Study of linear variable differential transformer (LVDT).
3. Study of capacitive transducer.
4. Study of piezoelectric transducer.
5. A mechatronic approach to the study of the following: Printers, Photocopier machine, Ignition system in automobiles, TV remote control, Washing Machine etc.
6. Calibration of pressure gauge using dead weight pressure gauge tester.
7. Calibration of orifice plate using anemometer.
8. Study and Calibration of Thermocouple.
9. Study on Hydraulic system power pack.
10. Study on Pneumatic system power pack.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2SS007 EFFECTIVE COMMUNICATION SKILLS	L	T	P		TH	CW	SW	PR	Total
	2	0	0	Max	-	50	-	-	50
Duration of Theory Paper: 3 Hours				Min	-	25	-	-	25

Objective of the subject:

To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.

COURSE CONTENTS

UNIT-1

Fundamentals of Communication:

The importance of communication; the basic forms of communication; the process of communication; why communication is necessary? ; art of communication.

UNIT-2

Inter – Personal Skills:

Building positive relationships; giving praise; dealing with criticism; managing conflicts; telephone speaking skills and cross – cultural communication skills.

UNIT-3

Listening:

The importance of listening; barriers to effective listening; approaches to listening; how to be better listener; what speakers can do to ensure better listening.

UNIT-4

Interviews:

Points to be remembered as an interviewer or an interviewee; commonly asked questions; types of interview; do's and don'ts.

UNIT-5

Making Presentations:

Speech purpose – general and specific; methods of speaking; analyzing the audience; non-verbal dimension of presentation, group discussion; importance; process; points to be kept in mind while participating; do's and don'ts.

Note: There shall be seminars and practice sessions by students.

BOOKS RECOMMENDED

- [1] P D Chaturvedi, P.D. & M Chaturvedi, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.
- [2] ICMR, *Business Communication*, Feb 2001.
- [3] J Davies, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education.
- [4] Lecture material given by the course teacher.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SMR3S3 EFFECTIVE COMMUNICATION SKILL	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To make fundamentally strong base for decision making skills by applying the concepts of communication.
- 2) To develop effective communication skills in engineers for expressing the technical ideas and for discussing the technical issues with confidence.
- 3) To develop soft skills of presentation, for developing affectivity in communication.

Pre requisite(s): Basic English.

COURSE CONTENTS

UNIT-I

Fundamentals of Communication: The Importance of Communication; the Basic forms of Communication; The Process of Communication; Types of Communication; Art of Communication. Barriers of Communication and their remedies.

UNIT-II

Inter-personal skills: Building Positive Relationships; Giving Praise; Dealing with Criticism; Managing Conflicts; Telephone speaking skills and Cross-cultural communication skills.

UNIT-III

Fundamentals of public Speaking: Speeches on topics of current concern ,listening- The importance of listening; Barriers to Effective Listening; Approaches to Listening; How to be a Better Listener; What speakers can do to ensure better listening.

UNIT-IV

Interviews: Points to be remembered as an interviewer or an interviewee; commonly asked questions; Types of interviews; Do's and Don'ts.

UNIT-V

Making Presentations: Speech Purpose- General and Specific; Methods of Speaking; Analyzing the Audience; Nonverbal Dimensions of Presentation, Group Discussions: Importance; Process; Points to be kept in mind while participating; Do's and don'ts.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Understand importance of communication process.
- 2) Understand importance of presentation.
- 3) Improve the barriers of communication.
- 4) Participate in interviews and group discussion.

BOOKS RECOMMENDED:

- [1] Chaturvedi P D, Chaturvedi M, *Business Communication: Concepts, Cases and Applications*, Pearson Education, Singapore Pvt. Ltd, 2004.
- [2] ICMR, *Business Communication*, Feb 2001.
- [3] Davies J, *Communication Skills: A Guide for Engineering and Applied Science Students*, 2/e Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME151 INDUSTRIAL ENGG & MANAGEMENT	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Objective of the subject:

To provide understanding about industrial management practices along with their linkages to organizational efficiency and effectiveness.

COURSE OF CONTENTS

UNIT-1

Methods Engineering:

Introduction to Methods Engineering and Productivity, Methods study, Recording techniques, Work Measurement tool and techniques. Work place Design - Fundamental of Work place Design. Introduction to job Evaluation and Wage Incentive Schemes

UNIT-2

Operations Management:

Introduction to Operations management, manufacturing v/s service, Tools and Techniques. Types of Production system. Facilities planning, Introduction to plant Layout .

UNIT-3

Organization and Management:

Principles of Management and Management functions. Organization, Principles, Structures, Span of Control, Delegation, Centralization and Decentralization, Formal and Informal Organizations. Personal Management, Introduction, Communication, Motivation and Leadership.

UNIT-4

Quantitative Techniques for Decision Making:

Introduction to operation Research, Basic Transportation and Assignment Models and Their Applications, Network Techniques and its Application

UNIT-5

Quality Control:

Quality planning and quality control Programme. Economics of Quality control. and control chart for variables and attributes. Introduction to TQM.

RECOMMENDED BOOKS:

1. I.L.O., *Work study*.
2. Monks, J.E. *Operations Management*, Mc. Graw Hills
3. Hira and Gupta, *Operation Research*, S. Chand and Co, New Delhi
4. Mahajan, *Statistical Quality Control*, Dhanpat Rai, New Delhi

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4C1 INDUSTRIAL ENGG. & MANAGEMENT	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The basic objectives of the subject are:

1. To understand fundamentals of industrial engineering management practices.
2. To understand the linkages of concepts and organizational efficiency and effectiveness.
3. To understand the concepts of productivity.
4. To understand the basic concepts of quality and its management.

Prerequisites: Basic knowledge of engineering and English is pre requisites for this subject.

COURSE CONTENTS

UNIT-I

Methods Engineering: Introduction to Productivity and Methods Engineering, Methods study, Recording techniques, Work Measurement tool and techniques. Work place Design - Fundamental of Work place Design. Introduction to job Evaluation and Wage Incentive Schemes.

UNIT-II

Operations Management: Introduction to Operations management, manufacturing v/s service, Tools and Techniques. Types of Production system. Facilities planning, Introduction to plant layout.

UNIT-III

Organization and Management: Principles of Management and Management functions. Organization, Principles, Structures, Span of Control, Delegation, Centralization and Decentralization, Formal and Informal Organizations. Personal Management, Introduction, Communication, Motivation and Leadership.

UNIT-IV

Quantitative Techniques for Decision Making: Introduction to operation Research, Basic Transportation and Assignment Models and Their Applications, Network Techniques and its Applications.

UNIT-V

Quality Control:

Quality planning and quality control Programme. Economics of Quality Control and control chart for variables and attributes. Introduction to TQM.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. After studying this subject the students will be able to visualize the industrial operations with respect to Productivity.
2. After studying this subject the students will be able to visualize Production Operations, Quality and Optimisation of industrial processes.
3. This subject will help the student to understand the concepts of Industrial Engineering in higher semester of this course.

RECOMMENDED BOOKS:

- 1) Industrial Labour Organization (I.L.O.), *Work study*.
- 2) Monks, J.E. *Operations Management*, Mc. Graw Hills.
- 3) Hira and Gupta, *Operation Research*, S. Chand and Co, New Delhi.
- 4) Mahajan, *Statistical Quality Control*, Dhanpat Rai, New Delhi.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME152 THEORY OF MACHINES	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

To provide knowledge about the different kinematic pairs and the relationship between the different mechanical linkages. The subject provide enough knowledge about the analysis of mechanical forces, velocity and acceleration analysis on different mechanical pairs and link.

COURSE OF CONTENTS

UNIT-1

Basics of theory of machines:

Degree of Freedom (Grubler's criterion), Inversions of Quadric cycle chain, single and double slider crank mechanism. Grashof's criterion, Types of kinematic synthesis, ~~Chebyshev spacing method for 3 positions, Synthesis of four bar function generator~~, Study Pantograph, Straight line mechanisms, Steering Mechanisms (Ackerman's mechanism, Delay's Steering Gear mechanism). Hooke's joint and engine indicators. ~~Determination of velocity and acceleration by analytical and/or graphical methods.~~

UNIT-2

Velocity and acceleration diagrams:

Determination of velocity and acceleration by analytical and/or graphical methods of various mechanisms., Coriolis components, Klien's construction.

UNIT-3

Cams:

Types of Cams and followers, Cam profiles with specified follower motion e.g. simple harmonic, constant velocity and acceleration types, Cams with specified contours. Tangent Cams, Displacement, Velocity and Acceleration of followers.

UNIT-4

Toothed Gearing :

Types of gears, Terminologies of various gears (Spur. Bevel gear, Helical gear, Worm and Worm wheel), Condition for correct gearing. Tooth profiles (cycloidal and involute). Gear trains, Epicyclic gear trains and their applications.

UNIT-5

Gyroscopes :

Product of inertia, Principle axis, Gyroscopic motion, Gyroscopic torque, Gyrostabilizer, Gyrocompass. Application to ships and aeroplanes. Stability of two & four wheelers.

RECOMMENDED BOOKS :

- [1] T. Bevan, *Theory of Machines*, CBS Publications & Distributions, 2000
- [2] J. Shigley, *Theory of Machines and mechanisms*, Oxford University, 2006.
- [3] Ambekar, A.G., *Mechanism and Machine Theory*, Jain Brothers-2005
- [4] Singh Sadhu, *Theory of Machines*, Pearson's Education -2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4C2 THEORY OF MACHINES	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1. To provide the knowledge of basics of mechanisms(Gears, cams,etc), degrees of freedom.
2. To give basic concepts of velocity and acceleration of mechanisms.
3. To develop skill to analyze the behavior and applications of gear trains.
4. To know the concept and effect of gyroscope.

Pre requisites: Engineering Mechanics, Engineering Physics, Engineering Mathematics.

COURSE CONTENTS

UNIT-I

Basics of Theory of Machines: Degree of Freedom (Grubler's criterion), **Concept of mechanism**, Inversions of Quadric cycle chain, single and double slider crank mechanism. Grashof's criterion, Types of kinematic synthesis, **Synthesis of four bar function generator**, Study of Straight line mechanisms(Paucellier, Tchebicheff's mechanisms), Steering Mechanisms (Ackerman's mechanism, Devi's Steering Gear mechanism). Hooke's joint and engine indicators.

UNIT-II

Velocity and Acceleration Analysis: Determination of velocity and acceleration by analytical and/or graphical methods of various mechanisms. , Study of Coriolis components, Klein's construction.

UNIT-III

Cams and Followers :Types of Cams and followers, Cam profiles with specified follower motion e.g. simple harmonic, constant velocity and acceleration and deceleration, cycloidal types, Cams with specified contours. Tangent Cams, Displacement, Velocity and Acceleration of followers.

UNIT-IV

Gears and Gear Trains :Types of gears, Terminologies of various gears (Spur. Bevel gear, Helical gear, Worm and Worm wheel), Condition for correct gearing, **Basics of gear meshing**, Tooth profiles (cycloidal and involute). Gear trains, Epicyclic gear trains and their analysis.

UNIT-V

Gyroscopes: Product of Inertia, Principle Axis, Gyroscopic Motion, Gyroscopic Torque, Gyrostabilizer, Gyrocompass. Application to Ships and Aero planes. Stability of Two & Four Wheelers.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

1. Understand the concept of mechanisms and their applications
2. Analyze the motion aspects of mechanisms.
3. Understand the Gears and their uses.

4. Learn basic fundamentals associated with Gyroscopic effect.

BOOKS RECOMMENDED:

- [1] Thomas, B., Theory of Machines, CBS Publications & Distributions, 2000
- [2] Shigley, J., Theory of Machines and mechanisms, Oxford University, 2006.
- [3] Ambekar, A.G., Mechanism and Machine Theory, Jain Brothers, 2005
- [4] Singh Sadhu, Theory of Machines, Pearson's Education, 2006.
- [5] Rattan, S.S., Theory of Machines, Tata McGraw Hill Education (P) Ltd., 2011

LIST OF PRACTICAL ASSIGNMENT

- 1. Study of cam and follower and finding velocity and acceleration of follower.
- 2. Study of slider crank mechanism.
- 3. Study of different kinematic pairs.
- 4. Generation of involute teeth profile for different gears.
- 5. Performance of interference and undercutting of tooth (by plotting).
- 6. Study of gyroscopic effect using gyroscope .
- 7. Reducing and enlarging drawings using pantograph ,study of straight line mechanisms.
- 8. Study of Double Hooks joint.
- 9. Study of Oldham's coupling .
- 10. Verification of Grashof's law.
- 11. Study of automobile steering gears.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year(Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME153MACHINE DESIGN DRAWING	L	T	P		TH	CW	SW	PR	Total
	4	0	4	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

Objective of the subject is to familiar the students with the design concepts and to provide the application of drawing in the design of different mechanical parts. Pre requisites is Engineering Drawing.

COURSE OF CONTENTS

UNIT-1

Engineering Materials: General selection of materials.

~~Manufacturing Considerations in Design: Tolerances, Fits and Surface Roughness.~~

Design and Drawing of Machine parts subjected to Tensile, Compressive and Shear Stresses such as ~~Levers~~, Pins, Keys and Cotter.

UNIT-2

Riveted Joints: Design and Drawing of Boilers, Structures and Eccentrically Loaded joints.

Welded Joints: Design and Drawings, Strength calculation for direct and eccentric loading.

UNIT-3

Screwed Fastenings: ~~Design of bolts~~, Eccentric loading and ~~Turnbuckle~~.

Power Transmission Elements: Design of shafts and Couplings.

UNIT-4

Machine Parts Drawings: Free Hand Sketches and fully dimensioned drawings of IC Engine Parts-Piston, Piston Rod, Connecting Rod, Crank Shaft and Flywheel using conventions and standard practices.

UNIT-5

Boiler Mountings: Free Hand Sketches and fully dimensioned drawings of Stop Valve, Feed Check Valve, Safety Valve and Blow off Cock using conventions and standard practices.

RECOMMENDED BOOKS:

Abdulla Sharif, Design of Machine Elements, Dhanpat Rai Publications (P) Ltd, New Delhi, 1995

P. C. Sharma, D. K. Agrawal, Machine Design, S. K. Kataria & Sons, New Delhi, 2007

K. Mahadevan, K. Balaveera Reddy, Design Data Hand Book, CBS Publishers & Distributors, New Delhi, 2007

P. S. Gill, Machine Drawing, S. K. Kataria & Sons, New Delhi 2007

LABORATORY EXPERIMENTS:

~~Application Program for Selection of Materials, Tolerances, Fits, and Surface Roughness using Computer Programming Languages such as C++ etc~~

~~Manual Design and Design Program for Keys, Pins and Cotters using Computer Programming Languages such as C++ etc~~

~~Manual Design and Design Program for Riveted Joints using Computer Programming Languages such as C++ etc~~

~~Manual Design and Design Program for Welded Joints using Computer Programming Languages such as C++ etc~~

~~Manual Design and Design Program for Bolts using Computer Programming Languages such as C++ etc~~

~~Manual Design and Design Program for Shaft and Couplings using Computer Programming Languages such as C++ etc~~

Manual Drawing of Piston and Piston Rod on Drawing Sheet

Manual Drawing of Connecting Rod on Drawing Sheet

Manual Drawing of Crank Shaft and Flywheel on Drawing Sheet

Manual Drawing of Stop Valve on Drawing Sheet.

Manual Drawing of Feed Check Valve on Drawing Sheet.

Manual Drawing of Safety Valves on Drawing Sheet.

Manual Drawing of Blow of Cock on Drawing Sheet.

Computer Aided Drawing of Any one of the Machine Parts using CAD Packages such as ~~AutoCAD Inventor and IDEAS.~~

~~Computer Aided Drawing of Any one of the Boiler Mountings using CAD Packages such as AutoCAD Inventor and IDEAS.~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER4C3 Machine Design & Drawing	3	1	2	3	1	1	5
Duration of Theory Paper: 4 Hrs							

Learning Objectives:

1. To develop in students, machine drawing skills for communication of design concepts, ideas and design of engineering products
2. To expose them to existing national standards related to drawings of machine parts.
3. To introduce the concept of design procedure of simple machine elements.

Prerequisite(s): Engineering Drawing.

COURSE CONTENTS

UNIT-I

Design Practice Introduction: Introduction, Classification, General Considerations and Procedure of Machine Design, Design Stress, Factor of Safety, Stress and Deflection Analysis, Engineering Materials and Applications, Design of Pins / Keys, Cotter and Knuckle.

UNIT-II

Design of Permanent Joint: Design of Riveted Joints for Boiler, Structures and Eccentric Loading. Design of Welded Joints for Direct and Eccentric loading.

UNIT-III

Design of Temporary Joints: Design of Screw Fasteners for Direct and Eccentric loading. Design of Shafts and Couplings.

UNIT-IV

Machine Drawing Concepts and Practices: Introduction, Classification of Machine Drawings - Assembly Drawing, Part Drawing, Detailed Drawing, Catalogues Drawing, Drawing for Instruction Manuals, Schematic Representation, Patent Drawing. Principles of Drawings, Sectioning, Dimensioning, Limits, Fits and Tolerance, Symbols and Conventional Representation. Assembly Drawings – Introduction, Types of Assembly, Importance of BOM, Assembly procedures, Assembly of Engine Parts.

UNIT-V

Assembly Drawing Concepts and Practices and Introduction to CAD: Assembly of Machine Tools Parts, Assembly of Boiler Mountings. Production Drawings - Definitions, Difference with Normal Drawings, Method of amendment of Corrections. Reproduction of Drawing - Blue printing, Ammonia Printing, Xeroxing, Printing, Plotting. Introduction of Computer Aided Drafting - Computer Aided Drafting and Design, Advantages of Computer Aided Drafting and Design, CAD Software.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Perform free hand sketching of machine parts with standard of machine drawing.
- 2) Select engineering materials based on their mechanical properties.
- 3) Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints.
- 4) Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints and couplings using CAD/CAM software.

Books Recommended:

- [1]. V B Bhandari, *Design of Machine Elements*, 3/e, McGraw Hill Education, 2015.
- [2]. N D Bhatt and V M Panchal, *Machine Drawing*, Charotar Publishing House, 2015.
- [3]. K. Mahadevan, K. Balaveera Reddy, *Design Data Hand Book*, CBS Publishers & Distributors, New Delhi, 2015.
- [4]. V B Bhandari, *Design Data Hand Book*, McGraw Hill Education, 2015.
- [5]. PSG, *Design Data: Data Book of Engineers* by PSG college –Kalaikathir Achchagan- Coimbatore.

- [6]. P S Gill, *A Text Book of Machine Drawing*, S K Kataria & Sons, 2015.
- [7]. P C Gope, *Machine Design: Fundamentals and Applications*, 1/e PHI, 2015.
- [8]. R L Norton, *Machine Design: An Integrated Approach*, Pearson Education, 2015.

LIST OF PRACTICAL ASSIGNMENT

- 1. Draw the Symbols and Conventional Representation and Sections of Simple Machine Elements.
- 2. Design and Conventional Drawing / Computer Aided Drawing of Cotter Joint and Knuckle Joint.
- 3. Design and Conventional Drawing / Computer Aided Drawing of Couplings.
- 4. Design and Conventional Drawing / Computer Aided Drawing of Riveted Joints.
- 5. Design and Conventional Drawing / Computer Aided Drawing of Welded Joints.
- 6. Design and Conventional Drawing / Computer Aided Drawing of Screw Fasteners.
- 7. Conventional Drawing / Computer Aided Drawing of Engine Parts.
- 8. Conventional Drawing / Computer Aided Drawing of Machine Tool Parts.
- 9. Conventional Drawing / Computer Aided Drawing of Boiler Mountings.
- 10. Design / Analyse a mechanical structure which may involve different components included in syllabus. Prepare assembly and production drawings

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME155 FLUID MECHANICS	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

To make a fundamentally strong base to design fluid systems and understand the different fluid properties.

Pre requisites of the subject is Engineering Thermodynamics.

COURSE OF CONTENTS

UNIT-1

Review of Fluid Mechanics

Introduction, Fluid Properties, Pressure and its measurement, Hydrostatic forces on submerged surfaces, Buoyancy and Stability. Relative Equilibrium.

Fluid Kinematics: Lagrangian and Eulerian Approaches, Fundamentals of Flow visualization, Potential flow, Stream function and Velocity Potential function, Vorticity, Rotationality and Circulation, Flow Nets, Reynold's Transport Theorem.

UNIT-2

Fluid Dynamics

Introduction, Conservation of mass, Mechanical energy and efficiency, Bernoulli's equation, Applications of Bernoulli's equation, Correction factors, Newton's Law and Conservation of momentum, Linear Momentum equation, Angular Momentum equation. Introduction to boundary layer, Laminar and Turbulent boundary layers, Boundary Layer Thickness, Reynold's Number, Boundary Layer Separation.

UNIT-3

Flow Over Bodies

Introduction, Navier-Stokes Equations, Drag and Lift, Friction and Pressure Drag, Drag Coefficients of common geometries, Parallel Flow over Flat Plates, Flow over Cylinders and Spheres, Aerofoils, Lift, Von-Karmon Vortex Street, Kutta-Joukowski Equation.

UNIT-4

Flow Trough Conduits

Flow through Pipes: Introduction to Laminar and Turbulent Flows, Entrance region, Fully Developed flow, Laminar Flow in pipes, Turbulent flow in pipes, Losses in Pipe flow, Hagen-Poiseuille's Equation, Dracy's Weisbach Equation, Moody's Chart, Piping Networks.

Open Channel flow: Classification, Froude's Number and Wave Speed, Specific energy, Continuity and Energy equations, Uniform flow and Gradually Varied flow.

UNIT-5

Compressible Flow

Stagnation Properties, Speed of Sound and Mach Number, One- Dimensional Isentropic Flow, Isentropic Flow Through Nozzles, Shock Waves and Expansion Waves, Rayleigh and Fanno Flows. Introduction to Computational Fluid Dynamics(CFD)System.

RECOMMENDED BOOKS-

- [1]—D. S Kumar, *Fluid Mechanics and Fluid Power Engineering*, S.K. Kataria & Sons, 2007
- [2] John F.Douglas,*Fluid Mechanics*,Pearson Education,2005.
- [3] Y.A. Centgel, *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill Co, 2003.
- [4] V. L Streeter and E. B. Wylie, *Fluid Mechanics*, McGraw-Hill Co, 2003.
- [5] C. White, *Fundamentals of Fluid mechanics*, McGraw-Hill Co, 2003.

LABORATORY EXPERIMENTS:

1. To verify Bernoulli's Theorem
2. Calibration of Venturi-meter and Orifice-meter.
3. To find the Friction Coefficient of different pipes.
4. ~~To Determine Coefficient of impact for the vanes.~~
5. Determination of different coefficients of the orifice
6. Calibration of external cylindrical mouth pieces of different diameters/ Different L/D ratios
7. Calibration of internal cylindrical or Borda's mouth piece.
8. To Visualize the Forced/ Free Vortex Phenomenon.
9. To determine loss of head in the fittings at various water flow rates.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4C4 FLUID MECHANICS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To make a fundamentally strong base to design fluid systems
- Understand the different fluid properties
- To develop skill to analyze fluid-flow patterns
- To become conversant with 'Fluid Dynamics, Fluid Kinematics in External and internal flows, Compressible flows.

Pre requisite(s) : Applied Mathematics I/II/III/IV, Applied Mechanics, Strength of Materials, Engineering Thermodynamics, Engineering Physics

COURSE CONTENTS

UNIT-I

Review of Fluid Mechanics: Introduction, Fluid Properties, Pressure and its measurement, Hydrostatic forces on submerged surfaces, Buoyancy and Stability. Relative Equilibrium.

Fluid Kinematics: Lagrangian and Eulerian Approaches, Fundamentals of Flow visualization, Potential flow, Stream function and Velocity Potential function, Vorticity, Rotationality and Circulation, Flow Nets, Reynold's Transport Theorem.

UNIT-II

Fluid Dynamics: Introduction, Conservation of mass, Mechanical energy and efficiency, Bernoulli's equation, Applications of Bernoulli's equation, Correction factors, Newton's Law and Conservation of momentum, Linear Momentum equation, Angular Momentum equation. Introduction to boundary layer, Laminar and Turbulent boundary layers, Boundary Layer Thickness, Reynold's, Number, Boundary Layer Separation.

UNIT-III

Flow over Bodies: Introduction, Navier-Stokes Equations, Drag and Lift, Friction and Pressure Drag, Drag Coefficients of common geometries, Parallel Flow over Flat Plates, Flow over Cylinders and Spheres, Aerofoils, Lift, Von-Karmon Vortex Street, Kutta-Joukowski Equation.

UNIT-IV

Flow through Conduits: Flow through Pipes: Introduction to Laminar and Turbulent Flows, Entrance region, Fully Developed flow, Laminar Flow in pipes, Turbulent flow in pipes, Losses in Pipe flow, Hagen-Poiseuille's Equation, Darcy's Weisbach Equation, Moody's Chart, Piping Networks.

Open Channel flow: Classification, Froude' Number and Wave Speed, Specific energy, Continuity and Energy equations, Uniform flow and Gradually Varied flow.

UNIT-V

Compressible Flow: Stagnation Properties, Speed of Sound and Mach Number, One- Dimensional Isentropic Flow, Isentropic Flow Through Nozzles, Shock Waves and Expansion Waves, Rayleigh and Fanno Flows. Introduction to Computational Fluid Dynamics (CFD) System.

Learning Outcomes:

Upon Completing the Course, Student will able to

- Well established concepts of the theory of fluid mechanics
- Develop bases of analyses in fluid mechanics
- Understand the fundamental mechanics involved in different fluid flow cases in applications
- Develop a base for Computational Fluid Dynamics (CFD)

BOOKS RECOMMENDED:

- [1] Douglas John F., *Fluid Mechanics*, Pearson Education, 2005.
- [2] Centgel Y. A., *Fluid Mechanics: Fundamentals and Applications*, McGraw-Hill Co, 2003.
- [3] Streeter V. L and Wylie E. B., *Fluid Mechanics*, McGraw-Hill Co, 2003.
- [4] White F., *Fundamentals of Fluid Mechanics*, McGraw-Hill Co, 2003.
- [5] Fox R.W., McDonald A T., Pritchard P. J., Mitchell J. W., *Fluid Mechanics*, 9ed 2015

LIST OF PRACTICAL ASSIGNMENT

- 1. To verify Bernoulli's Theorem.
 - 2. Calibration of Venturimeter and Orifice-meter.
 - 3. To find the Friction Coefficient of different pipes.
 - 4. Determination of different coefficients of the orifice
 - 5. Calibration of external cylindrical mouth pieces of different diameters/ Different L/D ratios
 - 6. Calibration of internal cylindrical or Borda's mouth piece.
 - 7. To Visualize the Forced/ Free Vortex Phenomenon.
 - 8. To determine loss of head in the fittings at various water flow rates.
 - 9. To Plot velocity potential and stream functions.
 - 10. To find the metacentric height of prismatic body.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year(Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
2ME154 MECHATRONICS	L	T	P		TH	CW	SW	PR	Total
	4	0	4	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective of the subject:

The present course is intended for the undergraduate students of mechanical engineering to give an introduction to the development of mechatronic systems by considering the modeling of the dynamics of the components, their interactions and overall behaviour and by describing the components of information processing from sensors through microcomputers/microcontrollers to actuators.

Prerequisites is, a basic understanding of the electrical and electronic devices along with the concepts of digital electronics and a basic course in computer science and engineering.

COURSE OF CONTENTS

Unit-1

Introduction to mechatronics:

Elements of a mechatronic system, Mechatronic design process, Application in mechatronics.

Introduction to signals & system: Block diagram approach to system modeling, Modeling of electrical, mechanical, translational and rotational, fluid and thermal systems, Measurement of system response, Linearization of non linear systems, Fourier series representation of signals, O/P response of first order systems.

Unit-2

Sensors & Transducers:

Introduction of sensors and transducers, Performance characteristics of sensors and measurement systems, Sensors for motion & position measurement, Force torque & tactile sensors, Flow sensors, Temperature measuring devices, Ultra sonic sensors, Range sensors, Active vibration control using magnetorestrictive transducers, Semiconductor, Fiber optic & microelectromechanical system(MEMS) devices in mechatronics.

Unit-3

Signal conditioning & recording of data:

Basic steps of signal conditioning, Devices for signal conditioning & data conversion : Voltage divider & rectifiers , bridge circuits, Operational and instrumentation amplifiers ,comparators & oscillators multiplexers, timers, amplitude modulation & demodulation ,voltage to frequency & frequency to voltage converters, pulse width modulation., Analog to digital conversion & digital to analog conversion ,Data recording & display devices.

Unit-4

Actuators:

Introduction , Mechanical actuation systems , Electrical actuation systems: solenoids & relays, electric motors: DC motors , AC motors , Stepper motors, Servo motor drive circuits , selecting a motor , Fluid power actuators, Piezoelectric actuators, Power amplifiers & actuators drives.

Unit-5

Interfacing & control of mechatronic systems:

Elements of a data acquisition & control system, Overview of input / output systems: Interfacing, I/O addressing , Interface requirements , Peripheral interface adapters , serial common interface , Input /Output card & software, open systems, Communication interfaces.

Introduction of various control systems, Control modes and control system performance, velocity control & adaptive control.

BOOKS RECOMMENDED

- [1] W.Bolton, *Mechatronics, 3rd Ed*, Pearson Education.
- [2] Nitai Gour & P.Mahalik, *Mechatronics: Principles, concepts and applications*, Tata McGraw-Hill Publishing Company Ltd.
- [3] Michael B.Histand & David Alciatore, *Introduction to mechatronics and measurement systems*, McGraw-Hill Publication.
- [4].Peckwith & Buck, *Mechanical Measurement* Addison Wesley Publishing company, Inc. Reading
- [5].D.S.Kumar, *Measurment & Control* Metropolitan Book Co. Delhi.
- [6].Narka and Choudhary, *Instrumentation, Measurement and analysis* Tata Mc Graw Hill, 2e, 2003

LABORATORY EXPERIMENTS

1. Study of electrical resistance strain gauges.
2. Study of linear variable differential transformer(LVDT).
3. Study of capacitive transducer.
4. Study of piezoelectric transducer.
5. A mechatronic approach to the study of the following:
Printers, Photocopier machine, Ignition system in automobiles, TV remote control, Washing Machine etc.
6. Calibration of pressure gauge using dead weight pressure gauge tester.
7. Calibration of orifice plate using anemometer.
8. Study and Calibration of Thermocouple.
9. Study on Hydraulic system power pack.
10. Study on Pneumatic system power pack.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER4G2 MECHATRONICS	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper:3 Hours							

Learning Objectives:

- 1) To provide an understanding of the mechatronic systems and their design process.
- 2) To learn about the response and behavior of the devices that go into a mechatronic product, their interactions and overall behavior of the mechatronic system.
- 3) To learn about the variety of sensors/transducers used in mechatronic applications and the processes used for the conditioning of signals.
- 4) To learn about the methods used for the actuation and control of mechatronic systems.

Pre requisites: Basic course in electrical and electronic devices along with the concepts of digital electronics and a basic course in computer science and engineering.

COURSE CONTENTS

UNIT-I

Introduction to Mechatronic: Introduction to the field of mechatronic, Elements of a mechatronic system, Mechatronic design process, Applications in mechatronic. Introduction to signals & system: Block diagram approach to system modeling, Modeling of electrical, mechanical, translational and rotational, fluid and thermal systems, Measurement of system response, Linearization of non linear systems, Fourier series representation of signals, O/P response of first order and second order systems.

UNIT-II

Sensors & Transducers: Introduction of sensors and transducers, Performance characteristics of sensors and measurement systems, Sensors for motion & position measurement, Force torque & tactile sensors, Flow sensors, Temperature measuring devices, Ultra sonic sensors, Range sensors, Magnetostrictive transducers, Semiconductor, Fiber optic & Microelectromechanical system (MEMS) devices in mechatronic.

UNIT-III

Signal conditioning & recording of data: Basic steps of signal conditioning, Devices for signal conditioning & data conversion : Voltage divider & rectifiers , bridge circuits, Operational and instrumentation amplifiers, filters, comparators & oscillators multiplexers, timers, amplitude modulation & demodulation, voltage to frequency & frequency to voltage converters, pulse width modulation. Analog to digital conversion & digital to analog conversion.

UNIT-IV

Actuators: Introduction, Mechanical actuation systems, Electrical actuation systems: solenoids & relays, electric motors: DC motors, AC motors, Stepper motors, Servo motor drive circuits, selection of a motor, Fluid power actuators: Hydraulic and Pneumatic actuation systems, piezoelectric actuators.

UNIT-V

Interfacing & control of mechatronic systems: Elements of a data acquisition & control system, Microprocessor and Microcontroller based systems, Overview of input / output systems: Interfacing, I/O addressing, Interface requirements, Peripheral interface adapters, Serial common interface, Input /Output card & software, open systems, Communication interfaces, Voltage regulators and power supplies, Introduction of various control systems, Control modes and control system performance.

Learning Outcomes:

Upon completing the course, student will able to:

- 1) Acquire the basic knowledge for the application of the core technologies in the areas of mechanics, electronics and information processing to the solution of problems.
- 2) Recognize the need for models of the systems in order to predict their behavior.
- 3) Select and integrate the appropriate devices for the pickup, conditioning and display of signals related to the various processes involved in a mechatronic system..
- 4) Select the suitable actuation and control system for a mechatronic application.

BOOKS RECOMMENDED

- [1] W.Bolton, *Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 4th Ed*, Pearson Education.
- [2] Nitai Gour & P.Mahalik, *Mechatronics: Principles, concepts and applications*, Tata McGraw-Hill Publishing Company Ltd.
- [3] Alciatore David G. & Histan Michael B., *Introduction to mechatronics and measurement systems, 4th Ed* McGraw-Hill Publication.
- [4] Carryer J.Edward, Ohline R.Matthew, Kenny Thomas W., *Introduction to Mechatronic Design*, Pearson Education, Indian Edition 2013.
- [5] Ramachandran K.P., Vijayaraghavan G.K., Balasundaram M.S., *Mechatronics Integrated Mechanical Electronic Systems, Wiley India Pvt.Ltd.*
- [6] Narka and Choudhary, *Instrumentation, Measurement and analysis* Tata Mc Graw Hill Publishing Company Ltd.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER4L2 Workshop/Practical (MECHATRONICS)	L	T	P	L	T	P	Total
Duration of Theory Paper: 0 Hrs.	-	-	2	0	0	1	1

Learning Objectives:

- 1) To learn about the construction and working of a variety of sensors/transducers used in mechatronic applications.
- 2) To learn about the actuation and control of mechatronic systems using hydraulic and pneumatic methods.
- 3) To learn about the construction and working of mechatronic systems used in a day-to-day lives.

Pre requisite(s): Basic course in electrical and electronic devices along with the concepts of digital electronics.

Learning Outcomes:

Upon completing the course, student will able to:

- 1) Acquire the basic understanding of the characteristics of various sensors and transducers used in mechatronic and measurement systems.
- 2) Select the suitable devices and arrange them in the circuit for the control of actuators using hydraulic and pneumatic means.
- 3) Acquire the basic understanding of common mechatronic systems.

LIST OF PRACTICAL ASSIGNMENT

1. Study of electrical resistance strain gauges.
2. Study of linear variable differential transformer (LVDT).
3. Study of capacitive transducer.
4. Study of piezoelectric transducer.
5. A mechatronic approach to the study of the following: Printers, Photocopier machine, Ignition system in automobiles, TV remote control, Washing Machine etc.
6. Calibration of pressure gauge using dead weight pressure gauge tester.
7. Calibration of orifice plate using anemometer.
8. Study and Calibration of Thermocouple.
9. Study on Hydraulic system power pack.
10. Study on Pneumatic system power pack.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE II Year (Common to All Branches)					
Subject Code & Name	Instructions Hours per Week			Marks					
2SS057 Engineering Economics	L	T	P		TH	CW	SW	PR	Total
	2	0	0	Max	-	50	-	-	50
Duration of Theory Paper: Only Internal Tests				Min	-	25	-	-	25

Objective of the subject: To make fundamentally strong base for decision making skills by applying the concepts of economics and accounting to cope up with the current dynamic business environment

COURSE OF CONTENTS

Unit-1

Engineering Economics

Economic Decision: Role of Engineering in Business; Concept, Nature and Scope of Economics & Business Economics; Types of Business Organizations.

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-2

National Income

Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income -Production Method, Income Method, Expenditure Method.

Unit-3 Consumer Demand

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-4

Production Supply

Production Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-5

Liberalization

Liberalization, Globalization & Privatization: Concept & Characteristics; Evaluation of New Liberal Economic, Policy of India; Economy through Globalization.

BOOKS RECOMMENDED

[1]C S Park, *Contemporary Engineering Economics*, Pearson Education, 2002

[2]J S Chandan, *Statistics for Business and Economics*,

[3]C Dislis, JH Dick, I D Dear & AP Ambler, *Test Economics and Design for Testability*,

[4]S Damodaran, *Managerial Economics*,

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SMR4S4 ENGINEERING ECONOMICS	L	T	P	L	T	P	Total
	2	0	0	2	0	0	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To make fundamentally strong base for decision making skills by applying the concepts of economics.
2. Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
3. Prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

COURSE CONTENTS

Unit-I

Introduction to Engineering Economics: Definitions, Nature and Scope of Economics; Difference between Microeconomics and Macroeconomics; Concepts of Engineering Economics- Engineering Efficiency and Economic Efficiency.

Consumer Demand Analysis: Meaning, Features and Determinants of demand; Law of Demand and its Exceptions; Reasons for Law of Demand; Importance of Law of Demand; Elasticity of Demand.

Unit-II

Supply Analysis: Meaning, Supply Function, Law of Supply, Determinants of Supply, Fluctuation of supply; Elasticity of supply and its measurement.

Unit-III

Theory of Production: Production Function, Factors of Production; Law of Variable Proportions; Law of returns to scale

Cost, Revenue and Profit Analysis: Cost Classifications for Predicting Cost Behavior; Concept of Profit, Gross Profit and Net Profit; Break Even Point (BEP).

Unit-IV

National Income: Circular Flow of Income, Meaning and Concept of National Income: GNP/GNI, NNP/NNI, Personal Income and Disposable Income; Methods of Computing National Income - Production Method, Income Method, Expenditure Method.

Unit-V

Economic Stabilization: Monetary Policy- Meaning, Objectives, Tools; Fiscal Policy- Meaning, Objectives, Tools.

Learning Outcomes:

1. Upon completing the course, students will be able to:
2. Understand major principles of economic analysis for decision making among alternative courses of action in engineering.
3. Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.

4. Solve economical problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

Books Recommended:

- [1] C S Park, Contemporary Engineering Economics, Pearson Education, 2002.
- [2] J S Chandan, Statistics for Business and Economics, Vikas Publishing.
- [3] H. L. Ahuja, Principles of Microeconomics, S. Chand (G/L) & Company Ltd, 2002.
- [4] D. N. Dwivedi, Macroeconomics Theory and Policy, Tata McGraw-Hill Publishing Company, 2010.
- [5] S Damodaran, Managerial Economics, Oxford University Press, 2010.

List of Assignments (Theory):

During the learning of course, students need to do assignment:

- Students are required to research and submit an outline of the past, present and future position of a company of their choice. The outline must include at least one properly labelled table and figure and at least two references.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours p			Marks					
	Week								
3ME101 Dynamics of Machine	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objectives & Pre requisites: To Develop the Understanding of Dynamic Behavior Machine components. Pre requisites are Theory of Machine.

COURSE CONTENTS

UNIT-1

Friction & Power Transmission Devices:

Introduction, classification and types of friction, laws of frictions and screw frictions, journal Bearings, thrust bearings, pivot and collar bearings, ball and roller bearings, single & multi-plate clutch, cone clutch, centrifugal clutch, belt, rope and chain drives.

UNIT-2

Brakes & Dynamometer:

Introduction, classification and types of brakes, shoe/block brake, band brake, band and block brake, internal expanding shoe brake, disc brake.

Introduction, classification and types of dynamometers, propulsion and breaking of vehicles.

UNIT-3

Analysis of Dynamic Forces:

Inertia force and inertia torque, D'Alemberts principle, gas forces, equivalent masses, piston efforts, crank shaft torque, turning moment diagrams, fly wheels, fluctuation of energy and speed.

UNIT-4

Governors:

Introduction, types and classifications, centrifugal governors, gravity controlled and spring controlled governors, inertia governors, governor characteristics and effect of friction.

UNIT-5

Balancing:

Balancing of Rotating Masses: Static and dynamic balancing, balancing a single cylinder engine, balancing multi-cylinder engines, Balancing of Reciprocating Masses: Primary and secondary balancing, locomotive balancing, hammer blow, pitching and swaying couples, conditions of balance in V-engine, radial engine and multi-cylinder in line engines.

BOOKS RECOMMENDED

- [1]. Rattan S.S., Theory of Machines, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Reprint 2005.
- [2]. Shigley J.E. and Uicker J.J., Theory of Machines and Mechanisms, McGraw Hill, Inc., 1995.
- [3]. Thomas Bevan, Theory of Machines, CBS Publishers and Distributors, 1984.
- [4]. Ghosh A. and Mallick A.K., Theory of Mechanisms and Machines, Affiliated East-West Press Pvt.Ltd., New Delhi, 1988.
- [5]. Rao J.S. and Dukupati R.V., Mechanism and Machine Theory, Wiley-Eastern Limited, New Delhi, 1992.
- [6]. John Hannah and Stephens R.C., Mechanics of Machines, Viva low-Priced Student Edition, 1999.

LABORATORY EXPERIMENTS:

- To determine the coefficient of friction between the surfaces of different materials by inclined plane method.
- To determine coefficient of friction between leather belt and CI pulley by differential band brake method.
- To determination the coefficient of friction between leather belt and wooden pulley by belt and pulley apparatus.
- To Study different types of bearings.
- To Determine the pressure distribution in the oil film of the journal bearing for various speeds and
- a) Plot the Cartesian and polar pressure curves for various speeds.
 - b) Determine the constants 'n' and 'K' in the summer field pressure function from the Cartesian pressure curves.
 - c) Plot the summer field pressure curve for each speed.
 - d) Compare the mean load, due to the mean upward pressure on the projected and developed areas of the bearing with
the total applied load.
 - e) With the aid of the values of 'n' and 'K' determined as above for each speed, determine the total load on the journal
and compare with total load on the bearing.
 - d) Determination of tractional torque.
- ~~To study different types of clutches.~~
- ~~To study different types of brakes.~~
- To study absorption types of dynamometer.
- To study transmission types of dynamometers.
- ~~To determine the torque in shaft by epicyclical gear train and holding torque apparatus~~
- To determine the moment of inertia of objects using trifler suspension method.
- To determine the moment of inertia of connecting rod by compound pendulum method.
- To determine characteristic curves of (i) sleeve position against controlling force and speed and (ii) radius of rotation for Watt, Porter, Proell and Hartnell type governors.
- To perform static balancing of given weights by balancing apparatus.
- To perform dynamic balancing of given weights by balancing apparatus.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER5C1 DYNAMICS OF MACHINE	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hrs	3	1	2	3	1	1	5

Learning Objectives:

- 1) To make students to understand the concept of development of forces in various machines/mechanisms.
- 2) To develop the understanding of the effects and their consequences on mechanism / machines.
- 3) To make them able to determine this forces and to develop the various methods to counter this forces.

Prerequisite(s): Theory of Machines, Strength of Materials, Applied Mathematics.

COURSE CONTENTS

UNIT-I

Friction in Screw threads: Screw Frictions and Screw jack.

Friction in Bearings: Pivot and Collar Bearings, Journal Bearings, Thrust Bearings, Ball and Roller Bearings.

Friction in Clutches: Single & Multi-plate Clutch, Cone clutch, Centrifugal Clutch.

Friction Drives: Belt, Rope and Chain Drives

UNIT-II

Brakes: Introduction, Classification and Types of Brakes, Shoe/Block Brake, Band Brake, Band and Block Brake, Internal Expanding Shoe Brake, Disc Brake.

Dynamometer: Introduction, Classification and Types of Dynamometers.

Propulsions and Breaking of Vehicles.

UNIT-III

Dynamic Force Analysis: Inertia Force and Inertia Torque, D. Alembert's Principle.

Dynamic Analysis in Reciprocating Engines: Gas Forces, Equivalent masses, Piston Efforts, Crank shaft Torque, Turning moment diagrams, Fly wheels, fluctuation of energy and speed.

UNIT-IV

Governors: - Introduction, Types and Classifications, Centrifugal Governors, Gravity Controlled and Spring Controlled Governors, Inertia Governors, Governor Characteristics and Effect of friction.

UNIT-V

Balancing of Rotating Masses: Static and Dynamic Balancing, Balancing a Single Cylinder Engine, Balancing Multi-Cylinder Engines

Balancing of Reciprocating Masses: Primary and Secondary Balancing, Locomotive Balancing, Hammer Blow, Pitching and Swaying Couples, Conditions of Balance in V-Engine, Radial Engine and Multi-Cylinder in line Engines.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- 1) Determine the Forces and Torques due to Friction in Bearings, Clutches and Belt Drives.
- 2) Determine the Forces and Torques due to Friction in Brakes and Vehicle Propulsion.
- 3) Determine the Forces and Torques in Reciprocating Engines.
- 4) Determine the Forces and Torques in Governor Mechanisms.
- 5) Determine the unbalancing Forces / Torques in Engines and Machines and to balance this Forces/Torques.

BOOKS RECOMMENDED:

1. Rattan S.S., *Theory of Machines*, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Reprint 2005.
2. Shigley J.E. and Uicker J.J., *Theory of Machines and Mechanisms*, McGraw Hill, Inc., 1995.
3. Thomas Bevan, *Theory of Machines*, CBS Publishers and Distributors, 1984.
4. Ghosh A. and Mallick A.K., *Theory of Mechanisms and Machines*, Affiliated East-West Press Pvt.Ltd., New Delhi, 1988.
5. Rao J.S. and Dukkupati R.V., *Mechanism and Machine Theory*, Wiley-Eastern Limited, New Delhi, 1992.
6. John Hannah and Stephens R.C., *Mechanics of Machines*, Viva low-Priced Student Edition, 1999.

LIST OF PRACTICAL ASSIGNMENTS

1. To determine the coefficient of friction between the surfaces of different materials by inclined plane method.
2. To determine coefficient of friction between leather belt and CI pulley by Simple & differential band brake method.
3. To determination the coefficient of friction between leather belt and wooden pulley by belt and pulley apparatus.
4. To determine the pressure distribution in the oil film of the journal bearing for various speeds and plot the curves, determine total load and tractional torque.
5. To determine the moment of inertia of objects using trifilar suspension method.
6. To determine the moment of inertia of connecting rod by compound pendulum method.
7. To determine characteristic curves of
 - a) Speed v/s sleeve displacement.
 - b) Controlling force v/s radius of rotation of the ball center, for Watt, Porter, Proell and Hartnell type governors.
8. To Perform balancing
 - a) Static balancing of given weights by balancing apparatus.
 - b) Dynamic balancing of given weights by balancing apparatus.
9. To determine the Brake Power using Rope Brake Dynamometer.
10. To determine the Slip and Creep in belt drive and to plot the various curves.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)						
Subject Code & Name		Instructions Hours per Week			Marks					
3ME102 MACHINE DESIGN I		L	T	P		TH	CW	SW	PR	Total
		4	-	4	Max	100	50	50	50	250
Duration of Theory Paper: 4 Hours					Min	35	25	25	25	110

Objective and Pre requisites: The objective of the subject to introduce the students about the design of mechanical components like spring, rotating elements, theory of failures etc. Advance methods of stress analysis will also be covered in the subject. Pre requisites is Dynamics of Machine.

COURSE CONTENTS

UNIT-1

Theory of Failures & Applications:

Theories of failure, their applications to the design problems. Design of parts subjected to torsional and/ or bending such as spiral, helical and leaf springs.

UNIT-2

Pressure Vessels and Cover Plates:

Analysis of thick cylindrical and spherical shells, compound cylinders, joint for steam and hydraulic pipes, parts of press fit and shrink fit, design consideration of pressure vessels and cover plates.

UNIT-3

Rotating Rings and Disks:

Disk of uniform thickness and disk of uniform strength. Effect of drilled hole and extra mass, design of flywheel and pulleys.

UNIT-4

Design Analysis of Curved Machine Members:

Crane Hook, Chain link, open and closed links, M/c. Frames, Wall brackets, design and selection of hooks and wire ropes.

UNIT-5

Experimental Methods in Design:

Brief idea about experimental stress analysis techniques and their applications and limitation.

Note: Only Mechanical Engineer's Handbook, Data-books and Certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1]. Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e, 2006
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K.Kataria & Sons, 11e, 2006
- [4]. Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications(P) Ltd., 3e, 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER5C2 MACHINE DESIGN I	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 4 Hours							

Learning Objectives:

- 1) To introduce the students about the concept and importance of the design (A decision making)
- 2) To give the concept about the theories of failures and importance of material's selection in design
- 3) To give the concepts about the design of basic mechanical components like springs, rotating elements etc.

Pre requisite(s): Theory of Machines, Strength of Materials, Material Science.

COURSE CONTENTS

UNIT-I

Theory of Failures & Applications:Theories of failure, their applications to the design problems. Design of parts subjected to torsional and/ or bending such as spiral, helical and leaf springs.

UNIT-II

Pressure Vessels and Cover Plates:Analysis of thick cylindrical and spherical shells, compound cylinders, joint for steam and hydraulic pipes, parts of press fit and shrink fit, design consideration of pressure vessels and cover plates.

UNIT-III

Rotating Rings and Disks:Disk of uniform thickness and disk of uniform strength. Effect of drilled hole and extra mass, design of flywheel and pulleys.

UNIT-IV

Design Analysis of Curved Machine Members:Crane Hook, Chain link, open and closed links, M/c. Frames, Wall brackets, design and selection of hooks and wire ropes.

UNIT-V

Experimental Methods in Design: Brief idea about experimental stress analysis techniques and their applications and limitation.

Note: Only Mechanical Engineer's Handbook, Data-books and Certified notes are allowed in the examination hall.

Learning Outcomes:

After Completing the Course, Student will be able to:

1. Have the importance, role and concept of design
2. Learn to apply the knowledge of material science in real life situations.
3. Design the basic machine elements like spring, cylinder etc.
4. Know about the latest stress analysis techniques

BOOKS RECOMMENDED:

- [1]. Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e, 2006
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K.Kataria & Sons, 11e, 2006
- [4]. Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications(P) Ltd., 3e, 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME103 PRODUCTION ENGINEERING-I	L	T	P		TH	CW	SW	PR	Total
	4	0	0	Max	100	50	-	-	150
Duration of Theory Paper: 3Hours				Min	35	25	-	-	60

Objectives & Pre requisites: The course contents are aimed to systematically link the processes to the production equipment and to present the main aspects of production engineering in a logical manner.

Prerequisites: Basic course in Manufacturing Processes.

COURSE CONTENTS

UNIT-1

Fundamentals of Machine Tools

Introduction, characteristics of machine tools, elements of machine tool structure: beds, column and frame, slides and sideways, spindles and spindle bearings, machine tool drives, machine tool testing, maintenance and safety.

UNIT-2

Tooling for Machine Tools

General tooling for machine tools(~~including for turrets, automats and CNC machines~~), Jigs-Fixtures: locating and clamping, principles of jigs and fixture design, design of drilling jigs, drill jig bushes and type of jigs ; milling fixtures, lathe fixtures, grinding fixtures, broaching fixtures, assembly fixtures, automated jigs and fixtures, materials for jigs and fixtures and jigs & fixture economics.

UNIT-3

~~Press Working, Press Tool & Forging Die Design~~

~~Introduction~~, press operations, press working equipment & press selection, components of a die assembly, types of dies, ~~cutting action in a die~~, die and punch clearances, cutting forces and power requirements, center of pressure, blanking die design, piercing die design, pilots, drawing dies, bending dies, ~~design procedure for progressive dies~~, materials & manufacture of sheet metal working dies.

~~Forging Die Design: Introduction, forging operations and forging equipments, selection of forging equipment, die design for drop forging and press forging, die, die design for upset and machine forging, materials & manufacture of forging dies.~~

UNIT-4

Design for Manufacture & Assembly

Introduction, product design considerations for machining, casting, forging, welding, plastic and composite parts. ~~DFMA approach and methodologies~~, design evaluation: minimum part assessment, robustness assessment, failure mode-effect analysis, value analysis, development of modular design, ~~minimizing part variations, design of parts to be multifunctional multiuse and ease of fabrication.~~

UNIT-5

~~Automation of Manufacturing Systems~~

~~Automation in production systems~~, automation principles and strategies, ~~basic elements of an automated system~~, levels of automation, industrial robotics, ~~automated production or transfer lines~~, automated material handling, storage and retrieval systems, ~~flexible manufacturing systems: components & applications~~, fundamentals of automated assembly systems & ~~automated inspection.~~

BOOKS RECOMMENDED:

- [1]. Sharma P. C., *Production Technology, Production Engineering*, S.Chand and Co, New Delhi, 1996.
- [2]. Pandey & Singh *Production engineering and science* Standard, Pub. & Distribution
- [3]. ~~HMT *Production Technology*, Tata McGraw Hill Publishing Company Ltd, New Delhi, 1993.~~
- [4]. ~~Chapman W.A.J., *Workshop Technology Part 1, 2 and, 3, 4e*, Viva Books Private Ltd.~~
- [5]. Mikell P Groover *Automation, Production systems & computer integrated manufacturing*, PHI, 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER5G1 PRODUCTION ENGINEERING - I	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To provide an understanding of the design features of the machine tools and the types tooling used in the manufacturing of mechanical components.
- 2) To learn about the various sheet metal processes and the equipments and tooling used to produce sheet metal parts.
- 3) To learn about the DFMA approach and methodologies
- 4) To learn about the basics of production systems and automation in production systems.
- 5) **Pre requisite(s):** A basic course in manufacturing processes and workshop practice.

COURSE CONTENTS

UNIT-I

Fundamentals of Machine Tools: Introduction and classification of machine tools, requirements and characteristics of machine tools, elements of machine tool structure: beds, columns and frames, slides and sideways, spindles and spindle bearings, machine tool drives, machine tool testing, maintenance and safety.

UNIT-II

Tooling for Machine Tools: General tooling for machine tools, jigs-fixtures: locating and clamping, principles of jigs and fixture design, design of drilling jigs, drill jig bushes and type of jigs ; milling fixtures, lathe fixtures, grinding fixtures, broaching fixtures, assembly fixtures, automated jigs and fixtures, materials for jigs and fixtures and jigs & fixture economics.

UNIT-III

Sheet Metal Working & Press Tools: Introduction to sheet metal forming, forming limit diagram, basic operations on sheet-metal, press working equipment & press selection, components of a die assembly, types of dies, die and punch clearances, forces and power requirements, center of pressure, blanking die design, piercing die design, pilots, drawing dies, bending dies, design considerations and defects in sheet-metal parts, materials & manufacture of sheet metal working dies.

UNIT-IV

Design for Manufacture & Assembly: Role of processing in design, factors determining process selection, Design for Manufacturability (DFM), Design for Assembly (DFA), product design considerations for machining, casting, forging, welding, plastic and composite parts. Design evaluation: minimum part assessment, robustness assessment, design for reliability, failure mode-effect analysis, value analysis, development of modular design and design for safety.

UNIT-V

Production systems and automation: Types of production systems, review of production concepts and mathematical models, reasons for automation, automation strategies and levels of automation, automation for machining operations, design and fabrication considerations, automated flow lines, methods of

workpart transport and transfer mechanisms, assembly systems, types and design considerations for the automated assembly systems, types of material handling equipment, design considerations for material handling system, conveyor systems, automated guided vehicle systems(AGV's).

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- 1) Understand the design features of the machine tools and tooling like jigs-fixtures and select them appropriately for different production processes and environments.
- 2) Understand the basic processes and set-ups used to produce sheet metal parts.
- 3) Understand some of the contemporary design methodologies used for the design and manufacture of parts.
- 4) Learn about basics of production systems and automation in materials handling and assembly systems.

BOOKS RECOMMENDED:

- [1] Sharma P. C., *A text Book of Production Engineering*, S. Chand Publishing ,11ed,1982.
- [2] Pandey PC & Singh CK, *Production Engineering and Science*, Standard Pub. & Distr. 2011.
- [3] Dieter E. George, Schmidt Linda, *Engineering Design*, McGraw-Hill Education,5ed, 2012.
- [4] Rao P.N., *Manufacturing Technology, Vol-1, Vol-2*, McGraw-Hill Education,2017
- [5] Groover Mikell P. *Automation, Production Systems & Computer Integrated Manufacturing*, PHI Learning Pvt Ltd.3ed, 2015.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME104 IC ENGINES AND GAS TURBINES	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objectives & Pre requisites: To develop the understanding of principal of working of Engines and Turbines.

Pre-requisites are Applied Thermodynamics & Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT-1

Introduction to I.C. Engine & Fuels

Engine classification, air standard cycles, Otto, diesel, stirling, ericsson cycles, ~~actual cycle analysis~~, two and four stroke engines, SI and CI engines, valve timing diagram, rotary engines, stratified charge engine. Fuels: Fuels for SI and CI engine, important qualities of SI engine fuels, important qualities of CI engine fuels, dopes, additives, gaseous fuels, LPG, CNG, biogas, product gas, alternative fuels for IC engines.

UNIT-2

SI Engine

Carburetion, mixture requirements, carburetor types, theory of carburetor, MPFI. Combustion in SI engine, flame speed, ignition delay, abnormal combustion and its control, combustion chamber design for SI engines. Ignition system requirements magneto and battery ignition systems, ignition timing and spark plug, electronic ignition.

UNIT-3

CI Engine

Fuel injection in CI engines, requirements, types of injection systems, fuel pumps, fuel injectors, injection timings. Combustion in CI engines, ignition delay, knock and its control, combustion chamber design of CI engines. Scavenging in 2 stroke engines, pollution and its control.

UNIT-4

Engine Cooling, Lubrication, Supercharging & Testing

Engine Cooling: Different cooling systems, radiators and cooling fans Lubrication: Engine friction, lubrication principle, type of lubrication, lubrication oils, crankcase ventilation. Supercharging: Effect of altitude on power output, Types of supercharging. Testing and Performance: Performance parameters, basic measurement, testing of SI and CI engines.

UNIT-5

Compressors, Gas Turbine & Jet Propulsion

~~Compressors: Classification, reciprocating compressors, single and multi stage, intercooling, volumetric efficiencies. Rotary compressors, classification, centrifugal compressor, elementary theory, vector diagram efficiencies, elementary analysis of axial compressors, surging and stalling, roots blower, vane compressor, performance analysis. Gas Turbines: Introduction, Classification, Application, Gas turbine and its components, Gas turbine power plants, Optimum pressure ratio for maximum specific and thermal efficiency in actual gas turbine cycle, Effect of operating variables on thermal efficiency, Air rate and work ratio. Jet Propulsion- Turbo jet, Turbo Prop, Ram jet, Rocket engines thrust power, Propulsive efficiency~~

and thermal efficiency, Jet propulsion performance, Specifying thrust and specific fuel consumption in each case for turbo jet and turbo propulsion units.

BOOKS RECOMMENDED:

- [1]. Mathur & Sharma, "*A Course in I.C. Engines*", Dhanpat Rai Publications, 1996.
- [2]. Ganeshan, "*Internal Combustion Engines*", Tata Mc Graw Hill Publication, 1992.
- [3]. Heywood J. B, "*Internal Combustion Engine Fundamentals*", Mc Graw Hill, 1988.
- [4]. Sarvanamatto, "*Gas Turbines*", H.I.H 1996.
- [5]. Sarvanamatto, Cohen H, Rogers, "*Gas Turbine Theory*", Longmans Green, 1996
- [6]. Yahya S. M., "*Turbines, Compressors and Fans*", Tata McGraw Hill Publications, New Delhi. 1996
- [7]. Yadav R., "*Steam and Gas Turbines*",

LABORATORY EXPERIMENTS:

- 1. Study of Fuel Injection Pump.
- 2. Study of Carburettor.
- 3. Study & performance of Four Stroke Four Cylinder S. I. Engine.
- 4. Study & performance of Four Stroke Four Cylinder C. I. Engine.
- 5. Study of Swinging Field Electrical Dynamometer with twin cylinder Four Stroke Diesel Engine.
- 6. Study of Water Brake Dynamometer with Four Stroke Four Cylinder S. I. Engine.
- 7. Study of Engine Cooling Systems.
- 8. Study of Engine Lubrication Systems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER5C4: IC ENGINES AND JET PROPULSION	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To make students to understand principal and working of Engines and Turbines
- 2) To develop the understanding of the effects of fuel combustion on environmental pollution.
- 3) To make students to understand principal and working of different systems used in IC Engines and Jet Propulsion.
- 4) To make them able to understand the testing performance parameters and various testing methods to determine these parameters of IC Engines and Jet Propulsion.
- 5) To understand the latest trends in IC Engines.

Pre requisite(s): Applied Thermodynamics, Elements of Mechanical Engineering.

COURSE CONTENTS

UNIT-I

Introduction to I.C. Engine & Fuels: Air standard cycles, Otto, Diesel, Stirling, Ericsson cycles, Engine classification- Two and four stroke-SI and CI engines, Stirling engine, Rotary engines, Stratified charge engine, Variable compression ratio engine. Valve timing diagram, Fuels: Fuels for SI and CI engine, important qualities of SI engine fuels, important qualities of CI engine fuels, dopes, additives, gaseous fuels, LPG, CNG, biogas, alternative fuels.

UNIT-II

SI Engine: Carburetion, mixture requirements and thermochemistry of petrol fuel, Carburetor types, theory of carburetor, Calculation of air /fuel ratio supplied by carburetor, MPFI System (petrol injection). Combustion in SI engine, flame Speed, ignition delay, abnormal combustion and its control, combustion chamber design for SI engines. Ignition system requirements, battery ignition systems, magneto ignition system, electronic ignition system, ignition timing, firing order and spark plugs, variable valve control- VVC, VVA, VVE, VVS VTC, VTEC, VTEC-E, i -VTEC, AVTEC, SI Hybrid Engine.

UNIT-III

CI Engine: Requirements of Fuel injection in CI engines, types of diesel fuel injection systems (Mechanically controlled and electronically controlled), fuel pumps, fuel injectors, injection Timings. Fuel injection computation in CI Engines, Combustion in CI engines, ignition delay, knock and its control, combustion chamber design of CI engines. Scavenging in 2 stroke engines.

UNIT-IV

Engine Cooling, Lubrication, Supercharging & Testing: Engine Cooling: Different cooling systems, radiators and cooling fans, Lubrication: Total Engine friction, lubrication principle, lubricating oils, type of lubricating systems, Testing and Performance: Performance parameters, basic measurements, testing of SI and CI engines and calculation of performance parameters. Supercharging: Effect of altitude on power output, Types of supercharging and turbocharging and effects on engine performance.

New Technologies of Engines- **Cylinder Deactivation**, Camless engines, DI Turbo Ethanol engine, KERS, HCCI, OPOC, and IC Engine with oscillating shaft.

UNIT-V

Compressors, Gas Turbines & Jet Propulsion: Dynamic Compressors- Centrifugal compressor and Axial Flow Compressor- elementary theory, **vector diagram efficiencies, and performance analysis and curves, Losses in dynamic compressors,** surging and stalling,

Gas Turbines: Introduction, Classification and Application, Gas turbine main components, , Optimum pressure ratio for maximum specific output and thermal efficiency in actual gas turbine cycle, Air rate and work ratio, **Open cycle Gas turbine with Regeneration , Reheat and Intercooling,Effect of operating variables on thermal efficiency.**

Jet Propulsion- Turbo jet, Turbo fan, Turbo Prop, Ram jet, Rocket engines, thrust power, propulsive efficiency and thermal efficiency, Jet propulsion performance, Specific thrust and specific fuel consumption in each case for turbo jet and turbo propulsion units.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Determine the air fuel ratio supplied by carburettor and MPFI system.
- 2) Determine the thermochemistry of fuels.
- 3) Design and select the combustion chambers of SI Engines.
- 4) Draw the valve timing diagram of SI Engines(Two and Four Stroke).
- 5) Determine the Torque/Mean effective pressure / BHP/FHP/IHP/volumetric efficiency/Brake thermal efficiency/Specific fuel consumption and other parameters of engines.
- 6) Determine the performance parameters of Centrifugal compressors, gas turbine, air crafts and rocket engines.

Books Recommended:

- [1]. Mathur & Sharma, “*Internal combustion Engines*”, Dhanpat Rai Publications, 2007.
- [2]. Ganeshan V “*Internal Combustion Engines*”, Tata Mc Graw Hill Publication, 1992.
- [3]. Heywood J. B, “*Internal Combustion Engine Fundamentals*”, Mc Graw Hill, 1988.
- [4]. Khajuria P.R., Dubey S.P., *Gas Turbines & Propulsive Systems*, Dhanpat Rai Pub, 2005
- [5]. Sarvanamatto, Cohen H, Rogers, “*Gas Turbine Theory*”, Longmans Green, 1996
- [6]. Yahya S. M., “*Turbines, Compressors and Fans*”, Tata McGraw Hill Publications, 1996
- [7]. Dr. R. Yadav, “*Steam and Gas Turbines*”, Central publishing House, 2015
- [8]. Dr. R. Yadav, *Applied Thermodynamics*, Central Publishing House, 2012
- [9]. Ganesan V. *Gas Turbines*, Tata McGraw Hill Publications, 1999

LIST OF PRACTICAL ASSIGNMENTS

- 1) To Study of carburettor, Induction system and combustion chamber in petrol engine
- 2) To study of MPFI systems and performance testing on MPFI SI engine.
- 3) To study of fuel injection systems and its components in diesel engines.
- 4) To study the Battery ignition system, Magneto ignition system and Electronic ignition system
- 5) To Study of Water Brake Dynamometer with Four Stroke Four Cylinder S. I. Engine.
- 6) Performance testing of Four Stroke Four Cylinder S. I. Engine
- 7) To Study of Swinging Field Electrical Dynamometer with twin cylinder Four Stroke Diesel Engine.
- 8) Performance testing of Four Stroke Four Cylinder C. I. Engine.
- 9) To Study of Engine Cooling and Lubrication Systems.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME105 HEAT TRANSFER AND MASS TRANSFER	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
	Duration of Theory Paper: 3 Hours			Min	35	25	25	25	110

Objective & Pre-requisites: Basic understanding to know mode of Heat Transfer systems. Pre-requisites are Applied, Thermodynamics, Fluid Mechanics & Calculus.

COURSE CONTENTS

UNIT-1

Conduction

General heat conduction equation in Cartesian coordinate, one dimensional steady state, conduction through plane wall, cylinder and spheres. ~~Composite walls cylinders and spheres. Critical thickness of insulation.~~ Effects of variable thermal conductivity on temperature distribution and heat flux.

UNIT-2

Fins and Unsteady State Heat Conduction

General heat flow equation through fins. Heat transfer from fins of uniform cross section for different boundary condition. Fins effectiveness and fins efficiency. Transient and periodic heat flow in lumped heat capacity systems.

UNIT-3

Forced Convection

Mechanism of convection, ~~forced and Free Convection Boundary Layer: Fundamentals Equations of energy in the boundary layer. Thermal boundary layer. The Nusselt number. Dimension less number used in convections. Empirical relations for convective heat transfer through tubes and flat plate, Heat transfer in turbulent flow. Reynolds analogy.~~

UNIT-4

Heat Exchangers, Boiling & Condensation

Basic types of heat exchangers. The overall heat exchangers. The overall heat transfer coefficient and fouling factor. Log-Mean temperature difference. Effectiveness-NTU approach.

Heat Transfer with Change of Phase: Fundamentals of boiling heat transfer. Boiling curve and various boiling regions. Condensation heat transfer phenomena.

UNIT-5

Radiation

~~Thermal Radiation. Monochromatic and total emissive power, absorptivity, reflectivity and transitivity, Kirchoff's Black and Gray bodies, Plank's distribution law, Stefan Boltzman's law, Heat transfer by radiation between Black surfaces, Electrical Analog for solving Radiation problems.~~

BOOKS RECOMMENDED:

- [1]. Holman J.P., *Heat Transfer*, Mc Graw Hill, 9e 2002.
- [2]. Eckert & Drake, *Heat & Mass Transfer*, Mc Graw Hill, 1972.
- [3]. Ozisic, *Basic Heat Transfer*, Mc Graw Hill, 1994.
- [4]. Patel R.C., *Heat Transfer*

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER5C3 HEAT TRANSFER	L	T	P	L	T	P	Total
		3	1	2	3	1	1
Duration of Theory Paper: 3 Hrs							

Learning Objectives:

1. To make a fundamentally strong base theory of heat transfer.
2. To understand different modes of heat transfer.
3. To model and simulate heat transfer phenomenon.
4. To extend the theory of heat transfer equipment.

Prerequisite(s): Fluid Mechanics, Engineering Thermodynamics, Applied Mathematics.

COURSE CONTENTS

UNIT- I

Steady State Heat Conduction: One Dimensional Heat Conduction Equation, General Heat Conduction Equation, Heat Conduction in Cylinders and Spheres, Heat generation in Plane wall and cylinders, Variable Thermal Conductivity, Thermal Contact Resistance, Illustrative Problems

UNIT- II

Heat Transfer from Extended Surfaces and Transient Heat Conduction: Steady flow of heat along a rod, Governing differential equations and its solutions, Heat dissipation from infinitely long fin, Heat dissipation from fin having insulated tip, Fin performance, Critical Radius of Insulation, Lumped System Analysis, Transient Heat Conduction in Large Plane Walls and Long Cylinders, Illustrative Problems

UNIT- III

Fundamentals of Convection: Physical Mechanism on Convection, Velocity Boundary Layer and Thermal Boundary Layer, Derivation of Differential Convection Equation, Natural Convection over Surfaces, Natural Convection from Finned Surfaces and PCBs, Forced Convection across Cylinders, Spheres and Tube Banks, Combined Natural and Forced Convection.

UNIT-IV

Fundamentals of Thermal Radiation: Introduction, Radiative Properties, View Factor Relations, Radiation Heat Transfer, Radiation Shields and the Radiation Effects.

UNIT- V

Heat Exchangers: Classification of Heat Exchangers, Nature of Heat Exchange process, Mechanical design of heat exchange surfaces, Performance analysis, Overall heat Transfer Coefficient, Effectiveness-NTU method, Cooling of Electronic Equipments, Illustrative Problems.

Learning outcomes:

Upon Completing the Course, Student will be able to:

1. List and Tabulate the Temperature Measuring Devices.

2. Determine the thermal conductivity of an insulating powder.
3. Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
4. Effectiveness and efficiency of pin fin by using pin fin apparatus
5. Determine and verify the value of Stefan Boltzmann constant experimentally..
6. Determine the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger.
7. Determine the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchanger

BOOKS RECOMMENDED

- [1] Cengel YA., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e, 2002.
- [2] Rudramoorthy R. *Heat Transfer-Theory and Problems*, Pearson Education, New Delhi, 2006
- [3] Christopher A, *Essential Heat Transfer*, Pearson Education, New Delhi, 2001.
- [4] Nag, P.K., *Heat Transfer*, Tata McGraw Hill, New Delhi, 1e, 2006.

List of Practical Assignments:

1. List and Tabulate the Temperature Measuring Devices
2. To determine the thermal conductivity of an insulating powder
3. To Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
4. To determine the Effectiveness and efficiency of pin fin by using pin fin apparatus
5. To Determine and verify the value of Stefan Boltzmann constant experimentally
6. Determining the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger
7. Determining the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchanger.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				B.E. III Year (Common to all the branches)					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS106 PRINCIPLES OF MANAGEMENT	L	T	P		TH	CW	SW	PR	Total
	2	-	-	Max	-	50	-	-	50
Duration of Theory Paper: Only Internal Test				Min	-	25	-	-	25

Objectives: To impart the basics of Management Concepts, Evolution of management as discipline and to deal with different Principles & Functions of Management.

COURSE CONTENTS

UNIT 1

The Nature of Management

Definition and role of management; the function of a manager, Scientific management. Various schools of management thought. The Functions & Principles of management.

UNIT 2

Planning

Nature and purpose of planning, Components of planning objective of business.

UNIT 3

Organization

Nature and purpose of organizing Structure, Centralization, Decentralization, Span of control, Delegation of authority relationship. Formal and informal organization.

UNIT 4

Directions & Staffing

Direction process, Theories of motivation and leadership, Need analysis, Communication.

UNIT 5

Control

Meaning and process of control, techniques of control evaluation, developing and compensating the employees, Merit rating.

BOOKS RECOMMENDED:

- [1]. Koontz and O'Donnel, Essentials of Management, Jan.1986
- [2]. R.D Agrawal, *Organization & Management*. 1997
- [3]. PeterDrucker, *Practice of Management* ,1992
- [4]. Mc Farland, *Management, Principal and Practice*.
- [5]. L.M Prasad, *Principal and Practice & Mgt*.
- [6]. T.N Chhabra, *Principal and Practice & Mgt*.
- [7]. G.R Terry, *Principal of Management's*.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SMR5S5 PRINCIPLES & PRACTICE OF MANAGEMENT	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To provide engineering students with an accelerated introduction to the basics of management and the language of business.
2. To provide a basis of understanding to the students with reference to working of Business Organizations through the process of Management.
3. To inculcate the managerial skills and to teach how it can be executed in a variety of circumstances.

Pre requisite(s): Nil

COURSE CONTENTS

UNIT-I

Introduction to Management and Organization: Basic concepts of management- definition, principles , levels and functions of management; Managerial roles and skills; Organization- meaning, types, business environment, efficiency and effectiveness.

UNIT-II

Planning: Nature and purpose of planning: Types of planning, planning process, forecasting; Objectives- setting objectives, types of objectives; Decision making.

UNIT-III

Organizing and Staffing: Organization chart, Organization structures, departmentalization, span of control, delegation of authority- centralization and decentralization; Informal organization; process of Staffing.

UNIT-IV

Directing: Direction- meaning, process and components; motivation- theories of motivation; leadership- types and theories of leadership; communication- process, barriers and types.

UNIT-V

Controlling Meaning and process of managerial control, techniques of control evaluation- budgetary and non-budgetary control techniques; Use of computers and IT in management

Learning Outcomes:

At the end of the course, students should be able to do the following:

1. Identify the key management processes and the relevance of management in organisations.
2. Understand the key management skills required in organisations and how these might be applied.
3. Evaluate their own managerial skills and the ways in which these might be developed.

BOOKS RECOMMENDED:

- [1]. Agrawal R.D, *Organization & Management*.1/E PHI 1997.
- [2]. Tripathy PC And Reddy PN, *Principles of Management*, Tata McGraw-Hill, 5th Edition, 2012.
- [3]. Dinkar Pagare, *Principles of Management*, Sultan Chand & Sons, 2000.
- [4]. G.K.Vijayaraghavan and M.Sivakumar, *Principles of Management*, Lakshmi Publications, 5th Edition, 2009.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER5L3 Workshop/Practical (MACHINE DESIGN – I)	L	T	P	L	T	P	Total
	0	0	2	0	0	1	1

Learning Objectives:

- 9) To solve the Practical based problems for the designing the Mechanical Components.
- 10) To introduce the market survey practice to the students.
- 11) To develop the practice for literature survey to the students.
- 12) To prepare the students to work in a team.

Pre requisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

1. Problem based on theory of failure.
2. Problem on Design for Helical Spring.
3. Problem on Design for Leaf Spring.
4. Problem on Design for Pressure Vessels
5. Problem on Design for Pipe Joints.
6. Problem on Design for Rotating Disc
7. Problem on Design for Flywheel.
8. Problem on Design for Pulleys.
9. Problem on Design for Crane Hook.
10. Problem on Design for Chain Drive

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 13) Get the practical knowledge of designing the various components of Internal Combustion Engine.
- 14) Learn the market survey practice.
- 15) Get practice of literature survey.
- 16) Learn to work in a team.

BOOKS RECOMMENDED:

- [1]. Shigley J.E., *Mechanical Engineering Design*, McGraw-Hill 2015.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2007.
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K.Kataria & Sons,11e,2013
- [4]. Bhandari V.B., *Design of Machine Elements*, McGraw-Hill, 4e,2017.
- [5]. Black and Adams, *Machine Design*, Mc.Graw Hill,1968.
- [6]. Maleev V.L., *I.C.Engine Design*, Mc.Graw Hill ,1945.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME152 MACHINE DESIGN II	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 4 Hours				Min	35	25	25	25	110

Objective and Pre requisites: The objective of the subject to introduce the students about the design of power transmission elements, parts subjected to dynamic loading (Fatigue Loading), Design of Internal Combustion Engine parts, seals and gasket. Pre requisites are Dynamics of Machine and Machine Design I.

COURSE CONTENTS

UNIT-1

Design of Power Transmission Elements

Design for single plate clutch, cone clutch, centrifugal clutch, flat belt, V belt, power screw, spur gear, helical gear and Bevel gear.

UNIT-2

Design for Dynamic Loading

Stress concentration factor, design of parts subjected to Fatigue loading.

UNIT-3

Design for Brakes

Design of shoe brakes, band brakes, block brakes, internal expanding brakes and disc brakes.

UNIT-4

Design for Internal Combustion Engine Parts

Design for engine cylinder, piston, connecting rod, ~~crank shaft, valves and valve gear mechanism.~~

UNIT-5

Seals and Gaskets

Brief Introduction about seals and gasket, selection of seals and gasket.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003.
- [2] Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006
- [3] Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2006
- [4] Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications (P) Ltd., 3e, 1995
- [5] Maleev V.L., *I.C. Engine Design*, Mc.Graw Hill , 1945
- [6] Black and Adams, *Machine Design*, Mc.Graw Hill, 1968

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER6C1 MACHINE DESIGN - II	L	T	P	L	T	P	Total
	3	1	0	3	1	0	4
Duration of Theory Paper: 4 Hours							

Learning Objectives:

1. To provide the knowledge of fundamentals of designing the Mechanical Components.
2. To introduce the designing of Internal Engine Components.
3. To develop skill to analyze the component under dynamic loading.
4. To introduce the importance of seals & gasket in Engine.

Pre requisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

UNIT-I

Design of Power Transmission Elements: Design for single plate clutch, cone clutch, centrifugal clutch, flat belt, V belt, power screw, spur gear, helical gear and Bevel gear.

UNIT-II

Design for Dynamic Loading: Stress concentration factor, design of parts subjected to Fatigue loading.

UNIT -III

Design for Brakes: Design of shoe brakes, band brakes, block brakes, internal expanding brakes and disc brakes.

UNIT-IV

Design for Internal Combustion Engine Parts: Design for Engine cylinder, piston, connecting rod.

UNIT-V

Design of Crank Shaft , Concept of Seals and Gasket:

Design of crank shaft, valves and valve gear mechanism Brief Introduction about seals and gasket.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Design the various components of Internal Combustion Engine.
2. Design the components under Dynamic Loading.
3. Understand the applications of seals & gaskets.

4. The different types of failure mode in mechanical components.

BOOKS RECOMMENDED:

- [1]. Shigley J.E., *Mechanical Engineering Design*, McGraw-Hill 2015.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2007.
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2013
- [4]. Bhandari V.B., *Design of Machine Elements*, McGraw-Hill, 4e, 2017.
- [5]. Black and Adams, *Machine Design*, Mc.Graw Hill, 1968
- [6]. Maleev V.L., *I.C. Engine Design*, Mc.Graw Hill, 1945

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME153 PRODUCTION ENGINEERING-II	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective and Pre requisites: The course contents are aimed to provide an understanding of the fundamental aspects of the various material processing technologies. Pre requisites are Material Science and Manufacturing Processes.

COURSE CONTENTS

UNIT-1

Theory of Metal Cutting:

Introduction, mechanics of metal cutting, oblique and orthogonal cutting, shear angle, rake angle and strain relationships, force and power relationships, heat generation and temperature rise in metal cutting, Machinability: criteria for evaluating machinability, factors affecting machinability, tool life and tool wear, variables influencing tool life, economics of metal cutting.

UNIT-2

Theory of Metal Forming:

Introduction, plastic deformation and yield criteria, temperature and friction in metal forming, overview of metal forming, processes mechanics of forming processes, rolling, forging, drawing, ~~deep drawing~~, bending, extrusion, ~~punching-blanking~~, defects in metal forming, advantages & limitations of hot & cold forming.

UNIT-3

Unconventional Machining Processes:

Introduction, electric discharge machining (EDM), electrochemical machining (ECM), ultrasonic machining (USM), abrasive jet machining (AJM), laser beam machining (LBM), electron beam machining (EBM), plasma arc machining (PAM)

UNIT-4

Surface Finish Measurement and Surface Treatment:

Introduction, elements of surface roughness, evaluation and representation of surface roughness, effect of surface finish on functional properties, measurement of surface roughness, surface clearing surface treatment, diffusion and ion implantation, surface coating and deposition processes: surface plating, conversion coating, physical vapour deposition, chemical vapour deposition, ~~organic coating, porcelain enameling and other ceramic coatings.~~

UNIT-5

Processing of Particulate Metals, Ceramics-Composites and other Special Processing Technologies:

Introduction, Basic processes, powder manufacture testing and blending, compacting, sintering, hot pressing, other techniques to produce high-density powder metallurgy products, properties of P/M products, advantages and limitation of powder metallurgy; processing of traditional ceramics, processing of new ceramics and cermets.

Shaping processes for Plastics and polymer matrix composites; ~~processing of integrated circuits and micro-fabrication technologies.~~

BOOKS RECOMMENDED:

- [1]. Sharma P. C., *Production Technology, Production Engineering*, S.Chand and Co, New Delhi, 1996.
- [2]. ~~Pandey & Singh *Production engineering and science* Standard, Publ. & Distribution~~
- [3]. HMT *Production Technology*, Tata McGraw-Hill Publishing Company Ltd, 1993.
- [4]. Amitabh Ghosh & Ashok Mullick *Manufacturing sciences* East west Pvt. Limited, New Delhi
- [5]. Mikell P Groover *Fundamentals of modern manufacturing*, John Wiley & Sons, Inc, 2000

LABORATORY EXPERIMENTS

1. Measurement of various features of tool geometry of a given single point tool using tool makers microscope.
2. ~~Measurement of various features of tool geometry of a drill bit and an end-mill cutter using tool makers —microscope.~~
3. Measurement of a component features using a profile projector.
4. Study of constructional features of the Lathe and to machine a job as per given dimensions on it.
6. Study of EDM machine.
7. Machining of a work part as per given drawing on EDM machine.
8. ~~Machining of a work part as per given drawing on CNC lathe machine.~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER6C2 PRODUCTION ENGINEERING-II	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To provide an understanding of the mechanics of metal cutting and various aspects of machinability and tool wear.
- 2) To learn about the fundamentals of bulk metal forming processes.
- 3) To learn about the various unconventional machining processes.
- 4) To learn about the various methods to evaluate and measure the surface finish and methods to improve the surface finish of engineering components.
- 5) To learn about the methods to process particulate materials and composites.

Pre requisite(s): A basic course in manufacturing processes and workshop practice.

COURSE CONTENTS

UNIT-I

Theory of Metal Cutting: Introduction, mechanics of metal cutting, oblique and orthogonal cutting, shear angle, rake angle and strain relationships, force and power relationships, heat generation and temperature rise in metal cutting. Machinability: criteria for evaluating machinability, factors affecting machinability, tool life and tool wear, variables influencing tool life, economics of metal cutting.

UNIT-II

Theory of Metal Forming: Introduction, plastic deformation and yield criteria, temperature and friction in metal forming, overview of bulk metal forming processes, mechanics of forming processes: rolling, forging, drawing, bending, extrusion; design consideration for the tooling/dies used in solid forming processes, defects in metal forming, advantages & limitations of hot & cold forming.

UNIT-III

Unconventional Machining Processes: Introduction, need and classification of unconventional machining processes. Principles, process parameters, set-up and applications of the following unconventional machining processes: electric discharge machining (EDM), electrochemical machining (ECM), ultrasonic machining (USM), abrasive jet machining (AJM), laser beam machining (LBM), electron beam machining (EBM) and plasma arc machining (PAM).

UNIT-IV

Surface Finish Measurement and Surface Improvement: Introduction, elements of surface texture, evaluation and representation of surface roughness, effect of surface finish on functional properties of parts. Measurement of surface roughness, surface cleaning and surface treatment, diffusion and ion implantation, Surface coating and deposition processes: surface plating, conversion coating, physical vapour deposition and chemical vapour deposition processes.

UNIT-V

Processing of Particulate Metals, Ceramics-Composites: Introduction, basic P/M processes, powder manufacture, testing and blending, compacting, sintering, hot pressing, other techniques to produce high-density powder metallurgy products, properties of P/M products, advantages and limitations of powder metallurgy; Processing of traditional ceramics, processing of new ceramics and cermets, types and properties of composites and shaping processes for polymer matrix composites.

Learning Outcomes:

Upon completing the course, student will be able to:

- 1) Learn the effect of various parameters on the metal cutting process.
- 2) Learn the mechanics of bulk metal forming processes and select the equipment and tooling needed for the various forming operations
- 3) Understand the importance of surface finish of manufactured parts and learn about the various methods to improve it.
- 4) Learn about the powder metallurgy processes and about the processing of ceramics and composites.

BOOKS RECOMMENDED:

- [1] Ghosh Amitabh & Mullick Ashok, *Manufacturing science*, East West Press Pvt.Ltd,2ed,2010.
- [2] Sharma P. C., *A Text Book of Production Engineering*, S. Chand Publishing,11ed,1982.
- [3] HMT(Hindustan Machine Tools), *Production Technology*, McGraw-Hill Education,2017
- [4] Mikell P Groover, *Fundamentals of Modern Manufacturing*, Wiley,6ed, 2015
- [5] Rao P.N., *Manufacturing Technology, Vol-1, Vol-2*, McGraw-Hill Education,2017.

LIST OF PRACTICAL ASSIGNMENT

- 1) Measurement of various features of tool geometry of a given single point tool and the tool wear using a tool maker's microscope.
- 2) Measurement of surface finish of machined components
- 3) Measurement of a component features using a profile projector.
- 4) To perform process planning and prepare operations sheet and tool layout for machining a workpart on a capstan/turret lathe.
- 5) To machine a given workpart according to the prepared process plan and operations sheet.
- 6) To study the constructional features of EDM machine.
- 7) To machine a work part as per given drawing on EDM machine.
- 8) To study of the constructional features of universal cylindrical grinder.
- 9) To estimate the power requirements and the forces generated theoretically at the chip tool interface during turning, drilling and milling operations.
- 10) To measure the forces generated at the chip tool interface during machining operations.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME154 FLUID MACHINES	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective & Pre-requisites: Basic understanding of Fluid Power systems like turbine & pump. Pre-requisites are Mechanics & Theory of Machines.

COURSE CONTENTS

UNIT-1

Dimensional Analysis and Similitude:

Dimensional homogeneity, Buckingham π theorem applications, dimensionless parameters, similitude modeling criteria and distorted models.

UNIT-2

Hydro Turbines:

General classification (Turbine and pumps), velocity triangle, Euler's equation of work done, efficiencies Pelton, Francis, Kaplan, Propeller and Bulb turbine, their constructional details and characteristics, unit quantities, specific speed and governing.

UNIT-3

Hydraulic Pumps:

Classification of pumps, centrifugal pumps, constructional details, characteristics and efficiencies, NPSH, specific speed, multistage and specific purpose pump. reciprocating pumps, indicator diagram, acceleration head, friction head, double acting pumps.

UNIT-4

Cavitations:

Definitions, types of cavitations, effect of cavitations, Thoma-cavitation factor. Apparatus for cavitations, factor apparatus for cavitations test, study of cavitations effects in pumps and turbines, prevention.

UNIT-5

Water Hammer and Surge Tanks:

Physical phenomenon of water hammer, fundamental equation, arithmetic integration, types of surge tanks.

BOOKS RECOMMENDED:

- [1]. Rao N.S.Govind, *Fluid Flow Machines* Tata Mc Graw Hill.
- [2]. Nagratham, *Fluid Machines and Systems*
- [3]. Kumar D.S, *Fluid mechanics and Machines* S.k Kataria & Sons 1997.
- [4]. Purohit R., *Hydraulic Machines*

LABORATORY EXPERIMENTS

1. Study & performance of Pelton wheel using Pelton Wheel test rig
2. Study & performance of Kaplan Turbine using Kaplan Turbine test rig
3. Study & performance of Centrifugal Pump using Centrifugal Pump test rig
4. Study & performance of Reciprocating Pump using Reciprocating Pump test rig.
5. ~~Study of manual centrifugal pump.~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER6C3 FLUID MACHINES	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To fundamentally understand the principle of fluid machines.
- 2) To understand the working and operation different fluid machines.
- 3) To model and simulate flow situations.
- 4) To extend the theory to related machines.

Pre requisite(s): Fluid Mechanics, Applied Mechanics, Engineering Thermodynamics, Applied Mathematics

COURSE CONTENTS

UNIT-I

Fundamental Principles: Newton's Laws of Motion and Reynolds Transport Theorem; Conservation of Momentum: Linear Momentum Equation, Angular Momentum Equation; Forces on stationary and moving vanes, Forces on closed conduits: Reducer and Expanders, Bends, Torque on Sprinklers

UNIT-II

Modelling and Similitude: Dimensional Homogeneity, Dimensionless parameters, Methods to find Dimensionless numbers, Buckingham π Theorem applications, Similitude: Modelling Criteria; Modelling Laws; Distorted Models. Conservation of Mass and Momentum

UNIT-III

Turbines: Hydraulic Turbines: Impulse and Reaction Turbines; Velocity triangles, Euler's Equation of Work Done, Efficiencies; Pelton, Francis, Kaplan, Propeller and Bulb turbine: Constructional details and Performance characteristics, Unit quantities, Specific Speed; Governing; Comparison with other Turbines: Steam Turbines, Gas Turbines, Jet Engines

UNIT-IV

Pumps: Rotodynamic Pumps: Centrifugal, Axial; Constructional details, Performance Characteristics, Losses and Efficiencies, Net Positive Suction Head, Specific speed, Pumps in series and parallel; Multistage and Specific purpose pumps

Positive Displacement Pumps: Types; Reciprocating Pumps: Indicator Diagram, Acceleration Head, Friction head, Air-Vessels, Double Acting Pumps

UNIT-V

Cavitations and Water Hammers: Cavitations: Definition and Genesis, Effects on pumps and turbines, Thoma-Cavitation Factor, Measurement of Cavitation: Apparatus, Cavitation test, Prevention; Water Hammer: Physical phenomenon, fundamental equation, arithmetic integration, Prevention; Surge tanks; types and Role

Learning Outcomes:

Upon completing the course, student will be able to

- 1) Apply well-established concepts of the theory of fluid machines.
- 2) Select Proper fluid machines.
- 3) Operate and develop insight in maintenance.
- 4) Develop a base for Computational Fluid Dynamics (CFD).

BOOKS RECOMMENDED:

- [1] Douglas John F., *Fluid Mechanics*, Pearson Education, 2005.
- [2] Dixon S.L., *Fluid Mechanics and Thermodynamics of Turbomachinery*, Elsevier, 5e, 2002, London.
- [3] Modi and Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Rajsons Publication Pvt Ltd, N Delhi, 5e, 2000.
- [4] Lal Jagdish, *Hydraulic Machines*, Metropolitan Book Company, 1995.

LIST OF PRACTICAL ASSIGNMENT

10. To determine the coefficient of impact of water jet on vanes
 11. Performance evaluation of Pelton wheel using Pelton Wheel test rig
 12. Performance evaluation of Kaplan Turbine using Kaplan Turbine test rig
 13. Performance evaluation of Centrifugal Pump using Centrifugal Pump test rig
 14. Performance evaluation of Reciprocating Pump using Reciprocating Pump test rig.
 15. Measure forces on different shapes model using a wind Tunnel.
 16. Performance evaluation of Francis Turbine using Francis turbine test rig
 17. Numerical Study of modelling and similitude of rotodynamic fluid machines.
 18. Study the phenomenon of water hammer in pipes
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME155 ENERGY CONVERSION SYSTEMS	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective Prerequisites: Basic understanding of Thermal Power systems & Non- Conventional Energy Systems. Prerequisites are Thermodynamics, Thermal Engineering.

COURSE CONTENTS

UNIT-1

Fundamentals of Non- Conventional Energy Systems

Principles of working and fields of applications of unconventional power sources like Wind Energy, tidal Energy, geo thermal Energy, solar energy. Sources of energy, magneto hydrodynamic (MHD) system, photovoltaic cells and fuel cells.

UNIT-2

Steam Generators

High-pressure steam boilers, Draught chimney calculations equivalent evaporation, heat balance sheet, Carnot and Rankine cycles, reheat and regenerative cycles binary vapour cycles.

UNIT-3

Nozzles

Introduction, general flow analysis, Nozzle equation, design parameters, types and construction of nozzles, theory of steam injectors, effect of friction on performance.

UNIT-4

Steam Turbines

Introduction, advantages of steam turbine, general analysis, degree of reaction, thermodynamic analysis, losses in steam turbines, classification and comparison between impulse and reaction turbines.

UNIT-5

Power Station Economics

Elements of fixed and operating costs, power and various tariffs, definitions and applications of load curves, load-factor, capacity factor, plant-utilization factor, diversity factor and demand factor. Energy audit.

BOOKS RECOMMENDED:

- [1]. Chang SSL, *Energy Conversion*, Prentice Hall, 1963
- [2]. Skrotzki & Vopat, *Power Station Engg. & Economy*, Mc Graw & Kagakush ,1960
- [3]. Soo, *Direct Energy Conversion*, Prentice Hall, 1968
- [4]. Angrist, *Direct Energy Conversion*, S.W Publication, 4e 1982.
- [5]. Yahya, *Turbine, Compression & Fans*.
- [6] Arora S.C. & Domkundwar S. *Power Plant Engineering* Dhanpat Rai Sons, 3e, 1993

LABORATORY EXPERIMENTS

1. To find boiler efficiency using Orsat's Apparatus.
2. ~~Energy audit of a Thermal power system.~~
3. Industrial Visit of any thermal power plant and carrying out energy audit.
4. Study of Steam Turbine in the thermal power plant
5. ~~To find the efficiency of a solar cooker.~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER6C4: ENERGY CONVERSION SYSTEMS	3	1	2	3	1	1	5
	Duration of Theory Paper: 3 Hours						

Learning Objectives:

- 1) To make students to understand principal and operation of vapour power cycles.
- 2) To develop the understanding of the combustion of fuel in boiler furnace.
- 3) To make students to understand principal construction and working of different types of power boilers used in steam power plants
- 4) To make them able to perform the testing to find boiler efficiency and heat balance sheet.
- 5) To understand the operation and design of steam turbines, Nozzles, condensers and cooling towers.

Pre requisite(s): Engineering Thermodynamics, Thermal Engineering

COURSE CONTENTS

UNIT-I

Vapour Power Cycles: Simple Rankine Cycles, Binary Vapour Cycles, Regenerative Cycles, Reheating Cycles, Combined Reheating-Regenerative Cycle, Water Extraction Cycle, Back Pressure, Pass-out and Mixed Pressure Turbine Cycles.

Power Station Economics: Elements of fixed and operating costs, power and various tariffs, definitions and applications of load curves, load factor, Capacity factor, plant-utilization factor, diversity factor and demand factor.

UNIT-II

Steam Generators: Fuels and Combustion for Steam Generators, High-pressure steam boilers- Advantages of high pressure boilers, Lamont Boiler, Benson Boiler, Monotube Boiler, Loeffler Boiler, Velox Boiler, Revolving Boilers, Radiant Type boiler for power plants, Heat recovery steam generators(HRSG), Fluidised Bed Boiler, Super Critical Boilers, Draughts, Chimney calculations, Performance of Boiler- Equivalent Evaporation, Boiler Trial , Boiler Efficiency, Heat balance sheet, Overview of Boiler Codes.

UNIT-III

Nozzles: Introduction, General flow analysis, Nozzle equation, , Types and Construction of Nozzles and Diffusers, Design Parameters, Theory of steam injectors, Flow through Nozzles and Diffusers, Nozzle Efficiency, Diffuser Efficiency, Critical Pressure Ratio, effect of friction on performance. Effect of Variation of Back Pressure.

UNIT-IV

Steam Turbines: Steam Turbine types, Flow of Steam through Impulse Turbine Blades, Flow of Steam through Impulse-Reaction Turbine Blades, Energy Losses in Steam Turbines, State Point Locus, Reheat Factor, and Design procedure, Governing and Performance of Steam Turbines, Steam Turbine Auxiliary Systems, Construction, Stress Analysis, Operation and Maintenance of Steam Turbines.

UNIT-V

Condensers and Cooling Towers: Functions of Condensers, Cooling Systems, Elements of Water Cooled Condensing unit, Types of Condensers- Jet Condensers, Surface Condensers, Condenser Vacuum and Measurement, Dalton's law of partial pressure, Mass of circulating water required, Air leakage, its effects and removal, Air cooling system, Design of condensers, Air Pumps, Vacuum Efficiency, Condenser Efficiency, Cooling Ponds and Cooling Towers, Analysis of Cooling Tower(Cooling efficiency, Range, Approach)

Learning outcomes:

Upon Completing the Course, Student will be able to:

1. Determine the overall efficiency of steam power plant through various arrangements of vapour power cycles.
2. Determine the thermo chemistry of fuels and Actual air and Coal required in Furnace of boilers
3. Understand the working of actual power boilers used in steam power plants, its chimney calculation and to perform the boiler trial for efficiency and input / output of heat
4. Understand the working of steam nozzles and diffusers and determine the performance parameters and efficiency of steam nozzles
5. Determine the Diagram Power, Gross Stage Efficiency, Specific steam consumption and Design parameters of steam turbines.
6. Understand the construction, operation and Maintenance of Steam Turbines and its auxiliaries.
7. Determine the performance parameters of Condensers, air pumps, cooling Towers.

BOOKS RECOMMENDED:

- [1]. Skrotzki & Vopat, *Power Station Engg. & Economy*, Mc Graw & Kagakush, 1960.
- [2]. Dr. R. Yadav, *Applied Thermodynamics*, Central Publishing House, 2012.
- [3]. Dr. R. Yadav, *Steam & Gas Turbines and Power Plant Engineering*, 2015.
- [4]. Yahya, S.M., *Turbine, Compressors & Fans*. TMH 1996.
- [5] Arora S.C. & Domkundwar S. *Power Plant Engineering* Dhanpat Rai Sons, 2005.
- [6] P.K. Nag, *Power Plant Engineering*, TMH, 2008.

LIST OF PRACTICAL ASSIGNMENTS

1. To study the working of High Pressure Boilers.
2. To Study the Induced Draught, Forced Draught and Balanced Draught.
3. To find the boiler efficiency using Orsat's Apparatus.
4. To study the Steam Nozzles and determine the Nozzle Efficiency.
5. To study the Steam Turbines in any Thermal power plant.
6. To study of Condensers and Cooling Towers and determine the Condenser Efficiencies.
7. To study and determine the thermal efficiency of any thermal power plant in an Industrial Visit.
8. To study and determine the thermal efficiency of cogeneration power plant in a Process Industry Visit.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. Mechanical Engg., (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER6G1 Materials Management	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

1. To inbuilt the concepts of Material handling and purchase procedure of an organization.
2. To impart the basics of standardization & stores management within organization.
3. To concrete the concepts of inventory management for effective decision making related to material & inventory.

Prerequisite(s): Basic concepts of Industrial Engineering and Management, Principles of Management.

COURSE CONTENTS

UNIT-I

Introduction: Objective of materials management, field and scope of material management, general analysis material quality, material planning programming. Integrated approach to Materials Management, Standardization, simplification, codification.

UNIT-II

Purchase Management: Scientific purchasing; objectives, organization of purchasing functions, Purchase cycle, Method of Buying; buying under certainty, buying under uncertainty, Purchasing under different circumstances , inspection and testing , purchasing for mass production , purchase contract , make or buy decision , material import , DGS & D rate contract.

UNIT-III

Stores Management: Stores organization, functions of scientific stores management, types of stores, store layout, store security, stores receipts, methods of storing, record – keeping & checking, issue methods, stores layout.

UNIT-IV

Inventory Management: Selective control of inventory, various inventory models, quantity discounts, shortages, instantaneous production with back orders, fixed time mode, single period model of profit maximization with time independent costs, lead time , re-order point , buffer stock, models with price breaks, , POQ system.

UNIT-V

Supply chain Management: Understanding the Supply chain, Process view of the supply chain, Supply chain performance: achieving Strategic Fit, Supply chain Drivers and Obstacles.

Learning Outcomes:

Upon Completing the Course, Student will able:

1. To understand the basics of Material handling techniques used in industries.
2. To understand the basics of purchase procedure and its management.
3. To understand the basics of stores and inventory management techniques used in industries. An overview of supply chain management.

BOOKS RECOMMENDED:

- [1]. Lee & Dobler, *Material management*. Tata Mc.Graw Hill, 1990, 5e
- [2]. Arnold J.R Tony & Stephen N. Chapman, *Introduction to Material management*. PHI, 2003, 7e
- [3]. Gopal Krishnan, *Material Management*, PHI 2015, 2e
- [4] L.C.Jhamb, *Materials and Logistics Managemnt*, Everest Publication, 1e
- [5] Sunil Chopara and Peter Meindl, *Supply chain Management*, Pearson Education, 6e

Devi Ahilya University, Indore, India Institute of Engineering & Technology				III Year B.E. Mechanical Engg., (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
3SS156 ENTREPRENEURSHIP DEVELOPMENT & IPR	L	T	P		Th	Cw	Sw	Pr	Total
	2	-	-	Max	-	50	-	-	50
	Duration of Theory Paper: Only Internal Test			Min	-	25	-	-	25

Objectives: To impart the basics of Entrepreneurship development Concepts. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur. To impart the basics of Intellectual property Rights.

COURSE CONTENTS

UNIT-1

Introduction

Definition of Entrepreneurship and role of an entrepreneur. Entrepreneurial characteristics, values and attitudes. Entrepreneurship development programmes.

UNIT-2

Modes & Methodology of setting up a Small Scale Industry

Project Identification, Market Survey, Location & Building, Technical Know - How, Raw material & other Utilities, Professional & Skilled Manpower, Project Report, Finance, Whom to Approach.

UNIT-3

Institutional Support to Entrepreneurs

Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs , DTICs, industrial Estates, Specialized Institutions. Registration of a small scale Industry.

UNIT-4

Intellectual Property Rights

Introduction of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators, Sharing of Knowledge, Trade Marks etc. General Provisions & Basic principles of IPR.

UNIT-5

Patents

Definitions, Need for a patents, what can be patented, Patent laws, Rights of Patent Holders, Filing of a Patent, Industrial Scenario.

BOOKS RECOMMENDED:

[1]. Colombo plan staff college for Technician Education, Manila , *Entrepreneurship Development*, Tata McGrawHill 1998

[2].N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition ,2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Information Technology (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SMR6S6 Entrepreneurship Development & IPR	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper:3 Hours							

Learning Objectives:

1. To provide awareness about entrepreneurship.
2. To develop the skills of entrepreneurship & to encourage the students to become an entrepreneur.
3. To self motivate the students by making aware of different opportunities and successful growth stories
4. To impart the basics of Intellectual property Rights.

Pre requisite(s): Nil

COURSE CONTENTS

UNIT I

Introduction to Entrepreneurship: Entrepreneurship- Concept, Nature, Functions and Importance; Entrepreneurs- Characteristics, Types and Motivation; Entrepreneurial process; Enterprise- Definition and Classification (MSME- Micro, Small & Medium Enterprises).

Case Study: Success and Failure stories of entrepreneurs and discussing their characteristics and reasons for success/failure.

UNIT II

Entrepreneurial Journey: Creativity and Innovation, Recognizing opportunities and Generating ideas, Feasibility analysis, Industry and Competitor analysis, developing effective business model.

Class Activity: Idea generation by students.

UNIT III

Business Plan for Start-ups in IT Industry: Project Identification, Market Survey, Production plan, Operational plan, Marketing plan, Organizational plan and financial plan; writing a business plan.

Class Activity: Students asked to finalize on their ideas and start writing business plans

UNIT IV

Institutional Support to Entrepreneurs: Need for Institutional support different Government & Non Government institutions to support Entrepreneurs like, NSIC, SIDO, SSIB, SSIDC, SISIs, DTICs, industrial Estates, Specialized Institutions.

UNIT V

Intellectual Property Rights: Introduction of IPR, General Provisions & Basic principles of IPR, various perspective of IPR like Innovation & Creation, Innovators & Creators; Patents, Copyrights and Trademarks.

Learning Outcomes:

At the end of the course, students should be able to do the following:

1. Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
2. Understand entrepreneurial process by way of studying different cases and performing class activities.

BOOKS RECOMMENDED:

- [1]. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 9th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2014.
- [2]. Bruce R. Barringer and R. Duane Ireland, "Entrepreneurship", 4th Edition, Pearson Publications, New Delhi, 2011.
- [3]. N.K. Acharya, *Text book on intellectual Property Rights*, Asha Law House New Delhi, New Edition, 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE III Year (Mechanical Engg.)					
Subject Code & Name	Instructions Hours per Week			Marks					
3ME151 CUSTOMER RELATIONS MANAGEMENT	L	T	P		TH	CW	SW	PR	Total
	4	0	0	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Objectives & Pre requisites:

To develop an understanding of the Supply Chain, its importance and interrelationships with other functions of company such as procurement, manufacturing and distribution.

COURSE CONTENTS

UNIT-1

Introduction

Introduction to supply chain management, need, importance, specific components, traditional material flow system, Supply chain, its context, components and structure recent trends – supply chains, strategic fit & metrics.

UNIT-2

Strategies:

Supply chain planning, orientation, supply chain strategies , supplier selection, global suppliers, Keritsu network , management of inventory and information managing supply chain options, uncertainties, Supply chain modeling.

UNIT-3

Inventory Management

Introduction, aggregate inventory management, Inventory and flow of materials, ABC and VED systems of inventory management, overview of associated costs, ware house management, importance, JIT, Vendor Management Inventory (VMI).

UNIT-4

Physical Distribution

Introduction, Physical distribution system, interfaces, transportation, significance of transportation in inventory management, transportation issues strategic operational and tactical, transportation planning.

UNIT-5

Information Management and Performance

Role of information for competitive advantage, strategic directions, information distortion BULL WHIP effect., customer service, integration , procurement and tracking systems, Introduction to performance managements- financial and non financial measures.

BOOKS RECOMMENDED

[1] Chopra Sunil and Meindl Peter, *Supply Chain Management: Strategy, Planning, and Operation*, Prentice Hall of India. 2002

[2] Simchi-Levi David, Kaminsky Philip, and Simchi-Levi Edith. , *Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies*. Irwin Mc-Graw Hill. 2000

[3] Bowersox D J and Closs D J, *Logistical Management*, Tata McGraw Hill Edition, New Delhi 2001.

[4] Mohanty R P and Deshmukh S G, , *Supply Chain Management: Theories and Practices*, Biztantra , New Delhi 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			III Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER6L4 Workshop/Practical(MACHINE DESIGN – II)	L	T	P	L	T	P	Total
	0	0	2	0	0	1	1

Learning Objectives:

- 1) To solve the Practical based problems for the designing the Mechanical Components.
- 2) To introduce the market survey practice to the students.
- 3) To develop the practice for literature survey to the students.
- 4) To prepare the students to work in a team.

Pre requisite(s): Machine Design I, Material Science, Strength of Material.

COURSE CONTENTS

1. Problem on Design of Single Plate Clutch/Cone Clutch
2. Problem on Design of Centrifugal Clutch.
3. Problem on Design of Flat/V Belt.
4. Problem on Design of Screw Jack.
5. Problem on Design of Spur/Helical/Bevel Gears.
6. Problem on Design of parts subjected to Fatigue Loading.
7. Problem on Design of Shoe/Band/Block/Internal Expanding Brake.
8. Problem on Design of Engine Cylinder/Piston/Connecting rod.
9. Problem on Design of Crank Shaft.
- 10 Problem on Design of Valve and Valve gear mechanism.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Get the practical knowledge of designing the various components of Internal Combustion Engine.
- 2) Learn the market survey practice.
- 3) Get practice of literature survey.
- 4) Learn to work in a team.

BOOKS RECOMMENDED:

- [1]. Shigley J.E., *Mechanical Engineering Design*, McGraw-Hill 2015.
- [2]. Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2007.
- [3]. Sharma P.C. & Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2013
- [4]. Bhandari V.B., *Design of Machine Elements*, McGraw-Hill, 4e, 2017.
- [5]. Black and Adams, *Machine Design*, Mc.Graw Hill, 1968.
- [6]. Maleev V.L., *I.C.Engine Design*, Mc.Graw Hill, 1945.

Devi Ahilya University, Indore, India Institute of Engineering and Technology				B.E. IV Year (Mechanical Engineering)					
Subject Code and Name	Instruction Hours Per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
4ME101 OPERATIONS RESEARCH	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper 3 Hour				Min	35	25			60

Objectives and Pre requisites: To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming, Transportation, Assignment, Queuing etc. and Strategies formulation with the help of game theory and simulation etc.

COURSE CONTENT

UNIT-1

Introduction

History and development of Operations Research, Scientific Methods, Characteristics, Scope, Models in Operations Research.

Linear Programming: Formulation, graphical methods, simplex method, Big- M- method

UNIT-2

Linear programming models

Assignment Models: Definition, Mathematical Representation, Formulation and Solution, Alternate optimal solution

Transportation Model: Definition, Formulation and solution, Alternate optimal solution, Stepping stone method, Modified distribution (MODI) or u-v method

Sequencing Models: Processing n jobs through two machines, m machines, and processing two jobs through m machines, Traveling salesman problem, and minimal path problem.

UNIT-3

Waiting Line and Dynamic programming Model

Models: Introduction, classification, state in queue, probability distribution of arrival and service times. Single server model (M/M/1). Multiple server model (MMS), Birth and death process.

Dynamic Programming: Introduction, Distribution characteristic, Dynamic programming approach, Optimal subdivision problem.

UNIT-4

Game Theory and Simulation

Theory of Game, Competitive game, Two persons, zero sum games, maximin and minimax Principles. Saddle point. Method of Dominance, graphical and algebraic method of solution by transforming into linear programming problem. Bidding problem. Building a simulation model, Monte-Carlo simulation and application.

UNIT-5

Network Analysis

Network diagram, Time estimation, Basic steps in PERT and CPM, PERT computation, CPM computation, critical path, Float, Cost analysis, Crashing the network.

BOOKS RECOMMENDED:

[1] Taha, *Operations Research*, Tata Mc.Graw Hill.2002

[2] Wagner, *Operations Research*, PHI. New Delhi, 2003

[3] Ravindram & Philips, *Operations Research*, Tata Mc.Graw Hill.2005

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7C1 OPERATIONS RESEARCH	L	T	P	L	T	P	Total
		3	1	0	3	1	-
Duration of Theory Paper: 3 Hours							

[4] Gupta & Hira, *Operations Research*, S. Chand. 1e, 2008

[5] Vohra N.D, Kataria S.K, *Quantitative Techniques for Management*. Tata Mc.Graw Hill, 2004.

Learning Objectives:

1. To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like linear programming.
2. To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like Transportation, Assignment, and Queuing etc.
3. To develop the skills of decision making in dynamic business situations through quantitative analysis using different mathematical models like Strategies formulation with the help of game theory and simulation etc.

Pre requisite(s): Industrial Engineering & Management and Materials Management.

COURSE CONTENTS

UNIT- I

INTRODUCTION: History and development Operations Research, Scientific Methods, Characteristics, Scope, Models in Operations Research. Linear Programming: Formulation, graphical methods, simplex method, Big- M- method

UNIT- II

TRANSPORTATION & ASSIGNMENT MODELS: Definition, Mathematical Representation, Formulation and Solution, Alternate optimal solution Transportation Model: Definition, Formulation and solution, Alternate optimal solution, Stepping stone method, Modified distribution (MODI) or u-v method. Traveling salesman problem, and minimal path problem.

UNIT- III

WAITING LINE MODELS: Introduction, classification, state in queue, probability distribution of arrival and service times. Single server model (M/M/I). Multiple server model (MMS). Birth & death process.

Dynamic Programming: Introduction, Distribution characteristic, Dynamic programming approach, Optimal subdivision problem.

UNIT- IV

GAME THEORY & SIMULATION: Theory of Game, Competitive game, Two persons, zero sum games, maximin and minimax Principles. Saddle point. Method of Dominance, graphical and algebraic method of solution by transforming into linear programming problem. Bidding problem. Building a simulation model, Monte-Carlo simulation and application.

UNIT- V

NETWORK ANALYSIS: Network diagram, Time estimation, Basic steps in PERT and CPM, PERT computation, CPM computation, critical path, Float, Cost analysis, Crashing of activities in the network

Learning Outcomes:

1. Students will be able to apply linear programming models in different practical situations.
2. Students will be able to optimize the resources different conditions.
3. Students will be able to know the various situation for queuing in service and industrial situations.
4. Students will be able to know the various strategies required in business decisions using game theory.
5. Students will be able to know the project implementation and control techniques using network analysis.

BOOKS RECOMMENDED:

- [1]. Taha, *Operations Research*, Tata Mc.Graw Hill.
- [2]. Wagner, *Operations Research*, PHI. New Delhi, 2003.
- [3]. Ravindram & Philips, *Operations Research*, Tata Mc.Graw Hill.
- [4]. Gupta & Hira, *Operations Research*, S. Chand. 1e, 2008
- [5]. Chitle & Negi, *Operations Research*, Jain Brothers.
- [6]. Vohra N.D, Kataria S.K, *Quantitative Techniques for Management*. Tata Mc.Graw Hill, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME102 MACHINE DESIGN III	L	T	P		TH	CW	SW	PR	Total
	4	-	4	Max	100	50	50	50	250
Duration of Theory Paper: 4 Hours				Min	35	25	25	25	110

Objective and Pre requisites: The objective of the subject to introduce the students about the new and advanced methods of design like optimization in design, reliability based design, high temperature resistance design etc. Pre requisites are Machine Design I & Machine Design II.

COURSE CONTENT

UNIT-1

Design for Bearings

Introduction about different types of bearings, Design for Journal bearing: Specifying bearing modulus, minimum oil film thickness, flow of oil, bearing heat balancing. Elementary treatment of contact stress, Selection of antifriction bearings.

UNIT-2

Reliability and Optimum based Design

Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability, System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

UNIT-3

Design for Tool Drive

Design of machine tool drives such as lathe, drilling and milling machine, speed diagram, ray diagram, preferred number.

UNIT-4

Design for Creep

Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

UNIT-5

Design for Un-symmetrical Bending

Design of parts of unsymmetrical sections, shear center, parts subjected to unsymmetrical bending.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill, 4e, 2003.
- [2] Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education, 8e, 2006
- [3] Sharma P.C. and Aggarwal D.K., *Machine Design*, S.K. Kataria & Sons, 11e, 2006
- [4] Shariff A., *Design of Machine Elements*, Dhanpat Rai Publications (P) Ltd., 3e, 1995
- [5] Maleev V.L., *I.C. Engine Design*, Mc.Graw Hill, 1e, 1945
- [6] Black and Adams, *Machine Design*, Mc.Graw Hill, 2e, 1968
- [7] Mubeen A., *Machine Design*, Khanna Publishers, 4e, 2005

LABORATORY EXPERIMENTS:

1. Problem on Design of Journal Bearing
2. Problem on selection of Antifriction Bearing.
3. Problem on Reliability based design.
4. Problem on Dimensioning of parts.
5. Problem on Optimum based design.
6. Problem on Design for Tool Drive.
7. Problem on Design for creep.
8. Problem on Design for Un-symmetrical Bending.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER7C2 Machine Design III	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 4 Hours							

Learning Objectives:

1. The objective of the subject to introduce the students about the new and advanced methods of design like optimization in design.
2. The objective of the subject to introduce the students about the new and advanced methods of design like reliability based design,
3. The objective of the subject to introduce the students about the new and advanced methods of design like high temperature resistance part design etc.
4. The objective of the subject to introduce the students about design of Journal Bearing and selection of Anti frictional Bearings from manufacturing catalogues.

Pre requisite(s): Machine Design I, Machine Design II.

COURSE CONTENTS

UNIT-I

Design for Bearings: Introduction about different types of bearings, Design for Journal bearing: Specifying bearing modulus, minimum oil film thickness, flow of oil, bearing heat balancing. Elementary treatment of contact stress, Selection of antifriction bearings.

UNIT-II

Reliability and Optimum based Design: Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability, System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

UNIT-III

Design for Tool Drive: Design of machine tool drives such as lathe, drilling and milling machine, speed diagram, ray diagram, preferred number.

UNIT-IV

Design for Creep: Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

UNIT-V

Design for Un-symmetrical Bending: Design of parts of unsymmetrical sections, shear center, parts subjected to unsymmetrical bending.

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Learning Outcomes:

Upon completing the course, student will be able to:

1. Design the machine components on the basis of Reliability.
2. Optimize the mechanical component design.
3. Design the component under high temperature condition.
4. Determine the arrangement and layout for tool drive design.
5. Evaluate and Design the Unsymmetrical component subjected to loading condition.

BOOKS RECOMMENDED:

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill ,4e,2003.
- [2] Spotts M.F.,Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006.
- [3] Sharma P.C. and Aggarwal D.K., *Machine Design*,S.K.Kataria & Sons,11e,2006.
- [4] Shariff A.,*Design of Machine Elements*,Dhanpat Rai Publications(P) Ltd.,3e,1995.
- [5] Maleev V.L., *I.C.Engine Design* , Mc.Graw Hill ,1e,1945.
- [6] Black and Adams, *Machine Design*, Mc.Graw Hill, 2e, 1968.
- [7] Mubeen A., *Machine Design*, Khanna Publishers, 4e, 2005.

LIST OF PRACTICAL ASSIGNMENTS

1. Problem on Design of Journal Bearing.
2. Problem on selection of Antifriction Bearing.
3. Problem on Reliability based design.
4. Problem on Dimensioning of parts.
5. Problem on Optimum based design.
6. Problem on Design for Tool Drive.
7. Problem on Design for creep.
8. Problem on Design for Un-symmetrical Bending.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME103, REFRIGERATION AND AIR-CONDITIONING	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective and Pre requisites

The basic objective of the subject is to introduce the processes involved in the refrigeration and air-conditioning to the students and the various systems used for the purpose. The Pre requisites are Thermodynamics, Heat transfer and Fluid mechanics

COURSE CONTENT

UNIT-1

Introduction and Air Refrigeration Systems

Introduction: Review of reversed Carnot Cycle, Coefficient of Performance, Types of Refrigeration Systems, Bell-Coleman cycle, Air-Refrigeration Cycles, systems for aircraft, Boot-strap type and simple evaporative systems, Applications of refrigeration systems.

UNIT-2

Vapour Compression Refrigeration (VCR) Systems

Thermodynamic Cycle, T-s and P-h diagrams, Analysis, effect of under-cooling and suction superheat, Limitations of VCR systems; Refrigerants: Classification, Properties and nomenclature, primary and secondary refrigerants, eco-friendly Refrigerants.

UNIT-3

Unconventional Refrigeration Systems and Future Trends

Vapor Absorption Systems: absorption cycle, Lithium-bromide system, heat-exchangers, analyzer and diffusers; The Electrolux system; Steam-Jet Refrigeration, Thermo-Electric Refrigeration. Low-temperature refrigeration: Cascade systems, Joule-Thompson effect, liquefaction of gases, application areas

UNIT-4

Psychrometry and Load Estimation

Psychrometry: Psychrometric Chart, Psychrometric properties and Processes; Psychrometers. Air-conditioning Load Estimation: Heat Transfer fundamentals; Cooling and heating load estimation, Heat transfer across the building envelope, thermal insulation, metabolism and heat exchange by the human body, thermal comfort, comfort charts; Solar Heat Gain, ventilation and infiltration. Sensible heat factors.

UNIT-5

Air Conditioning System

Air conditioning Systems: Types and selection, Air Systems, Water Systems, Room Air Conditioners – Window Type, Package Type, Split Type, Central Units. Air Supply Systems: Fans and Blowers, performance characteristics, heating and cooling coils, ~~By-pass factors~~, Flow through Ducts, Losses, Duct Design Methods. Air Distribution and control Devices.

Note : Refrigerant tables, Refrigeration and Air-conditioning Data Book and certified data tables are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Stoeker and Jones, *Refrigeration and Air-conditioning*, McGraw-Hill Co, 2008
- [2] Arora C.P., *Refrigeration and Air-conditioning*, TataMcGraw Hill, 2008.
- [3] Prasad M, *Refrigeration and Air-conditioning*. New Age Publishers, 9e, 2008
- [4] Ballaney P.L, *Refrigeration and Air-conditioning*, Khanna Publishers, 2008.
- [5] Ameen Ahmadul, *Refrigeration and AirConditioning*, Prentice-Hall of India, 2006

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER7C3 REFRIGERATION AND AIR-CONDITIONING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. Realise the importance of science of Refrigeration and Air-Conditioning.
2. Understand the different Refrigeration and Air-Conditioning systems.
3. Able to apply the learning outcomes of prerequisites for design and selection of Refrigeration and Air-Conditioning systems for specific applications.
4. Learn latest trends in Refrigeration and Air-Conditioning.

Prerequisite(s): Applied Mathematics I/II/III/IV, Engineering Thermodynamics, Fluid Mechanics, Thermal Engineering, Heat Transfer.

COURSE CONTENTS

UNIT -I

Introduction and Air Refrigeration Systems: Introduction: Review of reversed Carnot Cycle, Coefficient of Performance, Types of Refrigeration Systems, Bell-Coleman cycle, Air-Refrigeration Cycles, systems for aircraft, Boot-strap type and simple evaporative systems, Applications of refrigeration systems

UNIT -II

Vapour Compression Refrigeration (VCR) Systems: Thermodynamic Cycle, T-s and P-h diagrams, Components and types: Compressor, Condenser, Expansion device and Evaporator, Analysis, effect of under-cooling and suction superheat, Limitations of VCR systems; Refrigerants: Classification, Properties and nomenclature, primary and secondary refrigerants, eco-friendly Refrigerants.

UNIT-III

Unconventional Refrigeration Systems and Future Trends: Vapor Absorption Systems: absorption cycle, Lithium-bromide system, heat-exchangers, analyzer and diffusers; The Electrolux system; Steam-Jet Refrigeration, Thermo-Electric Refrigeration. Low-temperature refrigeration: Cascade systems, Joule-Thompson effect, liquefaction of gases, application areas.

UNIT -IV

Psychrometry and Load Estimation: Psychrometry: Psychrometers, Terminology, Psychrometric Chart, Psychrometric properties and Processes, Apparatus Dew Point (ADP), By-pass factor; Thermal Comfort: metabolism and heat exchange by the human body, comfort charts, Current ASHRAE Standards; Air-conditioning Load Estimation: Heat Transfer fundamentals; Cooling and heating load estimation, Heat transfer across the building envelope, thermal insulation; Solar Heat Gain, ventilation and infiltration. Sensible heat factors: Room Sensible Heat Gain Factor (RSHF), Grand Sensible Heat Gain Factor (GSHF) Effective Room Sensible Heat Gain Factor (ERSHF) lines

UNIT -V:

Air Conditioning Systems: Air conditioning Systems: Basic Components, Types and selection, Air Systems, Water Systems, Room Air Conditioners – Window Type, Package Type, Split Type, Central Units. Air Supply Systems: Fans and Blowers, performance characteristics, heating and cooling coils, Flow through Ducts, Losses, Duct Design Methods. Air Distribution and control Devices.

Note: Refrigerant tables, Refrigeration and Air-conditioning Data Book and certified data tables are allowed in the examination hall.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Understand the design and working principles of Refrigeration and Air-Conditioning systems.
2. Select Refrigeration and Air-Conditioning system components.
3. Learn advance subjects of Refrigeration and Air-Conditioning .
4. Industry ready for Refrigeration and Air-Conditioning industry.

BOOKS RECOMMENDED

- [1] Stoeker and Jones, Refrigeration and Air-conditioning, McGraw-Hill Co, 2008.
- [2] Arora C.P., Refrigeration and Air-conditioning, TataMcGraw Hill, 2008.
- [3] Prasad M, Refrigeration and Air-conditioning. New Age Publishers, 9e, 2008.
- [4] Ameen Ahmadul, Refrigeration and AirConditioning, Prentice-Hall of India, 2006.
- [5] Arora R. C., Refrigeration and Air-conditioning, TataMcGraw Hill, 2008.

LIST OF PRACTICAL ASSIGNMENT

1. To find the coefficient of performance of Vapour compression Refrigeration (VCR) system.
 2. To find the Refrigeration effect of Vapour compression Refrigeration (VCR) system.
 3. To find coefficient of performance of Air-conditioner Trainer system.
 4. To find Refrigeration effect of Air-conditioner Trainer system.
 5. To find various psychrometric properties of Air.
 6. To find the Refrigeration effect of Vapour Absorption Refrigeration (VAR) system.
 7. Estimate cooling load of a building envelop.
 8. To prove the relation between the coefficient of performance of a Heat Pump and a Refrigerator.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME104, STATISTICAL QUALITY CONTROL & TOTAL QUALITY MANAGEMENT	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
	Duration of Theory Paper: 3 Hours			Min	35	25	25	25	110

Objective and Pre requisites: The objective of the subject to introduce concepts of quality & quality control. To impart the knowledge of Total Quality Management philosophy this is widely adopted by the business organizations now a day. This course will enable the students to apply the concepts of Quality in the industries & get benefited.

COURSE CONTENTS

UNIT- 1

Basic Concepts of Quality

Meaning of Quality, Quality of Design, Quality of Conformance, quality of performance, Quality characteristic, Quality functions, Costs of Quality, Value of Quality, Quality control, Quality Control and inspection, Quality Policy, Objectives and organization, Quality Assurance. Statistical concept, Frequency distributions.

UNIT- 2

Statistical Quality Control

Concepts of Variations Process capability, variables and attributes, Theory of Control chart, Control chart for variable-x bar & R chart, Application of control chart for variables. Patterns of control charts. Control Chart for Attributes: **P, np, C** and demerit control charts & their application.

UNIT- 3

Acceptance Sampling

Fundamental concepts, OC Curve-construction of OC curve, Evaluation of parameters affecting OC curve, sampling plans: Single, Double, Multiple & Sequential sampling plans. Selection of sampling plan.

UNIT- 4

Total Quality Management

Introduction to TQM :- Feature of TQM System, Application & Benefits of TQM. Objective of TQM, Scope & Approach of TQM, Key Activity Areas of TQM, Principles of TQM, Total Quality management philosophy of Deming, Juran & Philip Crossby. TQM Models – Models for TQM Implementations, Strategic tools & techniques of TQM.

UNIT- 5

Reliability & Iso 9000

Basic Concept of reliability, Reliability and Quality, failures and failures modes, Causes of failure and unreliability, Maintainability and availability. System reliability models- System with components in series. Systems with parallel components. Need for Quality system, History of ISO: 9000 series of standards, features of ISO: 9000 series of standards.

BOOKS RECOMMENDED:

- [1] Kapur K.C. & Lamberson, *Reliability in Engg. Design*, Wiley Eastern.
- [2] Grant E.L. & Leave Worth, *Statistical Quality Control*, Tata Macgrawhill.
- [3] Juran and Gryan, *Quality Planning Analysis*, Tata Macgrawhill.
- [4] Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons(P)Ltd, 3e, 2003.
- [5] Sharma D. D., *Toatal Quality Management*, Sultan Chand & Sons, 2e,2004.
- [6] Besterfield, *Toatal Quality Management*, Pearson Education, 3e,2005.

LABORATORY EXPERIMENTS:

1. Study and Analysis of set parameters relating to different mathematical distributions(Variable).
2. Study and Analysis of set parameters relating to different mathematical distributions (Discrete).
3. Construction & analysis of various process control charts.
4. Performance of Acceptance Sampling for a given set of lots.
5. Analysis of tools of related to total Quality Management like QFD, Fish bone diagram etc.
6. Case studies related to Quality Problems.
7. Case studies related to Quality Control.
8. Case studies related to Quality Management.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E1 SQC & TQM	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The objective of the subject to introduce concepts of quality & quality control.
2. To impart the knowledge of Total Quality Management philosophy this is widely adopted by the business organizations now a day.
3. This course will enable the students to apply the concepts of Quality in the industries & get benefited.

Pre requisite(s): Industrial Engineering & Management & Materials Management.

COURSE CONTENTS

UNIT- I

BASIC CONCEPTS OF QUALITY: Meaning of Quality, Quality of Design, Quality of Conformance, quality of performance, Quality characteristic, Quality functions, Costs of Quality, Value of Quality, Quality control, Quality Control and inspection, Quality Policy, Objectives and organization, Quality Assurance. Statistical concept, Frequency distributions.

UNIT- II

STATISTICAL QUALITY CONTROL: Concepts of Variations Process capability, variables and attributes, Theory of Control chart, Control chart for variable-x bar & R chart, Application of control chart for variables. Patterns of control charts. Control Chart for Attributes: **P, np, C** and demerit control charts & their application.

UNIT- III

ACCEPTANCE SAMPLING: Fundamental concepts, OC Curve-construction of OC curve, Evaluation of parameters affecting OC curve, sampling plans: Single, Double, Multiple & Sequential sampling plans. Selection of sampling plan.

UNIT- IV

TOTAL QUALITY MANAGEMENT: Introduction to TQM :- Feature of TQM System, Application & Benefits of TQM. Objective of TQM, Scope & Approach of TQM, Key Activity Areas of TQM, Principles of TQM, Total Quality management philosophy of Deming, Juran & Philip Crosby. TQM Models – Models for TQM Implementations, Strategic tools & techniques of TQM.

UNIT- V

RELIABILITY & ISO 9000: Basic Concept of reliability, Reliability and Quality, failures and failures modes, Causes of failure and unreliability, Maintainability and availability. System reliability models- System with components in series. Systems with parallel components. Need for Quality system, History of ISO: 9000 series of standards, features of ISO: 9000 series of standards.

Learning Outcomes:

Upon completing the course, student will be able to:

- 1) Understand the concept of Quality and basic statistical concepts.
- 2) Preparation of Process control chart in the different industrial process.
- 3) Understand the concepts of Acceptance Sampling.
- 4) Apply the basics of Total Quality Management and its implementation.
- 5) know the system reliability concept and ISO standards.

BOOKS RECOMMENDED:

- [1] Kapur K.C. & Lamberson, *Reliability in Engg. Design*, Wiley Eastern.
- [2] Grant E.L. & Leave Worth, *Statistical Quality Control*, Tata Macgrawhill.
- [3] Juran and Gryan, *Quality Planning Analysis*, Tata Macgrawhill.
- [4] Mahajan M., *Statistical Quality Control*, Dhanpat Rai & Sons(P)Ltd, 3e, 2003.
- [5] Sharma D. D., *Toatal Quality Management*, Sultan Chand & Sons, 2e,2004.
- [6] Besterfield, *Toatal Quality Management*, Pearson Education, 3e,2005.

LIST OF PRACTICAL ASSIGNMENTS

1. Study and Analysis of set parameters relating to different mathematical distributions(Variable).
 2. Study and Analysis of set parameters relating to different mathematical distributions (Discrete).
 2. Construction & analysis of various process control charts.
 3. Performance of Acceptance Sampling for a given set of lots.
 4. Analysis of tools of related to total Quality Management like QFD, Fish bone diagram etc.
 5. Case studies related to Quality Problems.
 6. Case studies related to Quality Control.
 7. Case studies related to Quality Management.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME105, ARTIFICIAL INTELLIGENCE	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Objective and Pre requisites: The objective of the subject is to introduce the students about the problems and techniques of AI. The course content provides the theoretical aspects of AI and explore the ways that the current AI techniques can be used. The Pre requisites are knowledge of computer programming, data structures, familiarity with mathematical topics like probability, logic and decision procedures.

COURSE CONTENT

UNIT-1

Introduction to Artificial Intelligence

Introduction and history of AI, Human intelligence versus artificial intelligence, Task domains of AI, Representations in AI, Introduction to AI techniques, Limitations of AI. Defining the AI problem as state space search, Problem characteristics and search techniques: Heuristic search techniques. Problem reduction and constraint satisfaction.

UNIT-2

Knowledge Representation

Introduction and need for a good representation, Ways of representing knowledge, Syntactic and semantic systems, Predicate logic, Production rules, Nonmonotonic systems, Statistical reasoning systems, Semantic nets, Frames, Conceptual dependency and Scripts. Problem solving: Inference and Resolution.

UNIT-3

Expert Systems and Machine Learning

Introduction, Rule based expert systems, Knowledge acquisition and Knowledge bases, Architecture of an expert system, Introduction to CLIPS(C Language Integrated Production System), Introduction to techniques for machine learning, Version spaces and Nearest Neighbour Algorithm, Introduction to machine vision.

UNIT-4

Neural Networks and Fuzzy Logic Systems

Introduction, Supervised learning and Unsupervised learning, Neurons, Perceptrons, Multilayer neural networks, Recurrent networks, Unsupervised learning networks, Learning in Neural Networks and applications of neural networks. Introduction to fuzzy logic systems, Crisp sets and fuzzy sets, fuzzy logic control, Neuro fuzzy systems.

UNIT-5

Planning and Language Processing

Overview of planning and components of planning systems, Planning methods, Introduction to Natural language processing: Syntactic processing and Semantic analysis, Ambiguity and pragmatic analysis, Overview of programming languages of AI like LISP/PROLOG. Implementations of AI based applications in LISP/PROLOG.

BOOKS RECOMMENDED:

- [1] Rich Elaine, Knight Kevin, Nair Shivashankar B., *Artificial Intelligence*, McGraw-Hill ,3e,2009.
- [2] Coppin Ben, *Artificial Intelligence Illuminated*, Narosa Publishing House ,2005
- [3] Charniak Eugene, McDermott Drew, *Introduction to Artificial Intelligence*, Pearson Education,2e,2007
- [4] Russell Stuart, Norvig Peter, *Artificial Intelligence A Modern Approach*, Pearson Education,2e,2007
- [5] Winston Patric Henry, *Artificial Intelligence* , Pearson Education Asia, 3e, 2000.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E2 Artificial Intelligence	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The main objective of the subject is to introduce the students about the problems and techniques of AI.
2. The course content provides the theoretical aspects of AI and explore the ways that the current AI techniques can be used.
3. The objective of the subject to introduce the students about the Expert Systems and Machine Learning.
4. The objective of the subject to introduce the students about the fuzzy logic systems, Crisp sets and fuzzy sets.

Pre requisite(s): Data structures, Computer Programming, Applied Mathematics I, II, III & IV.

COURSE CONTENTS

UNIT-I

Introduction to Artificial Intelligence: Introduction and history of AI, Human intelligence versus artificial intelligence, Task domains of AI, Representations in AI, Introduction to AI techniques, Limitations of AI. Defining the AI problem as state space search, Problem characteristics and search techniques: Heuristic search techniques. Problem reduction and constraint satisfaction.

UNIT-II

Knowledge Representation: Introduction and need for a good representation, Ways of representing knowledge, Syntactic and semantic systems, Predicate logic, Production rules, Nonmonotonic systems, Statistical reasoning systems, Semantic nets, Frames, Conceptual dependency and Scripts. Problem solving: Inference and Resolution.

UNIT-III

Expert Systems and Machine Learning: Introduction, Rule based expert systems, Knowledge acquisition and Knowledge bases, Architecture of an expert system, Introduction to CLIPS (C Language Integrated Production System), Introduction to techniques for machine learning, Version spaces and Nearest Neighbour Algorithm, Introduction to machine vision.

UNIT-IV

Neural Networks and Fuzzy Logic Systems: Introduction, Supervised learning and Unsupervised learning, Neurons, Perceptrons, Multilayer neural networks, Recurrent networks, Unsupervised learning networks, Learning in Neural Networks and applications of neural networks. Introduction to fuzzy logic systems, Crisp sets and fuzzy sets, fuzzy logic control, Neuro fuzzy systems.

UNIT-V

Planning and Language Processing: Overview of planning and components of planning systems, Planning methods, Introduction to Natural language processing: Syntactic processing and Semantic analysis, Ambiguity and pragmatic analysis, Overview of programming languages of AI like LISP/PROLOG. Implementations of AI based applications in LISP/PROLOG.

Learning Outcomes:

Upon completing the course, student will be able to:

1. Familiar with the history, concept of Artificial Intelligence.
2. Familiar with Expert Systems and Machine Learning processes.
3. Understand, analyse and solve problems in the fuzzy logic systems, Crisp sets and fuzzy sets.

BOOKS RECOMMENDED:

- [1] Rich Elaine, Knight Kevin, Nair Shivashankar B., *Artificial Intelligence*, McGraw-Hill ,3e,2009.
- [2] Coppin Ben, *Artificial Intelligence Illuminated*, Narosa Publishing House ,2005
- [3] Charniak Eugene, McDermott Drew, *Introduction to Artificial Intelligence*, Pearson Education,2e,2007
- [4] Russell Stuart, Norvig Peter, *Artificial Intelligence A Modern Approach*, Pearson Education,2e,2007
- [5] Winston Patric Henry, *Artificial Intelligence* , Pearson Education Asia ,3e,2000.

LIST OF PRACTICAL ASSIGNMENTS

1. Write a program to solve 8 queens problem.
2. Solve any problem using depth first search.
3. Solve any problem using best first search.
4. Solve 8-puzzle problem using best first search.
5. Solve Robot (traversal) problem using means End Analysis.
6. Solve traveling salesman problem.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME106 ROBOTICS	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Objective and Pre requisites: The objective of the subject to introduce the students about the new and advanced methods to implement on design of Industrial robot and its impact on Automation.

COURSE CONTENT

UNIT-1

Introduction

Automation and Robotics, CAD/CAM and Robotics, An over view of Robotics, Present and future applications, Classification by coordinate system and control system.

UNIT-2

Components of the Industrial Robotics

Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom, Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-3

Robot Arm Kinematics

Direct and inverse kinematics, Rotation matrices, Composite rotation matrices, Euler angle representation, Homogenous transformation, Denavit Hattenberg representation and various arm configuration.

UNIT-4

Robot Arm Dynamics

Lagrange – Euler formulation, joint velocities, Kinetic energy, Potential energy and motion equations, Generalised D'Alembert equations of motion.

UNIT-5

Application of Robotics

Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading- Processing, Spot and continuous arc welding & spray painting, Assembly and Inspection.

BOOKS RECOMMENDED:

- [1] Fu K. S., *Robotics (Control, Sensing, Vision and Intelligence)*, McGraw-Hill, 4e, 2003.
- [2] Schilling R.J., *Fundamental of Robotics*, Prentice Hall, 1990.
- [3] Wesley, Sryda E., *Industrial Robots: Computer interfacing and Control*, Prentice Hall, 1985.
- [4] Groover M.P., *Industrial Robotics Technology Programming and Applications*, McGraw-Hill, 1986.
- [5] Asada and Slotine, *Robot Analysis and Control*, John Wiley and Sons, 1986.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E3 ROBOTICS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The main objective of the subject to introduce the students about the new and advanced methods to implement on design of Industrial robot.
2. Objective of the subject to introduce the students about the new and advanced methods to implement on Industry Automation.
3. Students will demonstrate an understanding of how to program robots and computers that control manufacturing automation.

Pre requisite(s): Theory of Machine, Dynamics of Machine.

COURSE CONTENTS

UNIT-I

Introduction: Automation and Robotics, CAD/CAM and Robotics, An over view of Robotics, Present and future applications, Classification by coordinate system and control system.

UNIT-II

Components of the Industrial Robotics: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom, Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT-III

Robot Arm Kinematics: Direct and inverse kinematics, Rotation matrices, Composite rotation matrices, Euler angle representation, Homogenous transformation, Denavit Hattenberg representation and various arm configuration.

UNIT-IV

Robot Arm Dynamics: Lagrange – Euler formulation, joint velocities, Kinetic energy, Potential energy and motion equations, Generalised D'Alembert equations of motion.

UNIT-V

Application of Robotics: Robot Application in Manufacturing: Material Transfer, Material handling, loading and unloading- Processing, Spot and continuous arc welding & spray painting, Assembly and Inspection.

Learning Outcomes:

- 1) Familiar with the history, concept development and key components of robotics technologies.
- 2) Familiar with various robot sensors and their perception principles that enable a robot to analyse their environment, reason and take appropriate actions toward the given goal.
- 3) Understand, analyse and solve problems in spatial coordinate representation and spatial transformation, robot locomotion design, kinematics, motion control.

BOOKS RECOMMENDED:

- [1] Fu K. S., *Robotics (Control, Sensing, Vision and Intelligence)*, McGraw-Hill, 4e, 2003.
- [2] Schilling R.J., *Fundamental of Robotics*, Prentice Hall, 1990.
- [3] Wesley, Sryda E., *Industrial Robots: Computer interfacing and Control*, Prentice Hall, 1985.
- [4] Groover M.P., *Industrial Robotics Technology Programming and Applications*, McGraw-Hill, 1986.
- [5] Asada and Slotine, *Robot Analysis and Control*, John Wiley and Sons, 1986.

LIST OF PRACTICAL ASSIGNMENTS

1. Assignment on introduction to robot configuration.
 2. Demonstration of robot with 2 DOF, 3 DOF, 4 DOF etc.
 3. Two assignments on programming the robot for applications.
 4. Two assignments on programming the robot for applications in VAL II.
 5. Two programming exercises for robots.
 6. Two case studies of applications in industry.
 7. Exercise on robotic simulation software.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instructions Hours per Week			Marks					
4ME107 TRIBOLOGY	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

COURSE CONTENTS

Objective of the subject:

The basic objective of the subject is to deal fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are material science and machine design.

UNIT- 1

Fundamentals of Tribology

Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques, statistical description.

UNIT- 2

Friction of Surfaces

Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods, friction of non metallic materials.

UNIT- 3

Wear Mechanism

Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-4

Theory of Lubrication

Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizes, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring, Additives in lubricants.

UNIT- 5

Design for Tribological Elements

An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Basic Equation for fluid film lubrication Boundary lubrication, Hydrodynamic lubrication, elasto hydrodynamic lubrication.

BOOKS RECOMMENDED:

- [1] Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975
- [2] Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- [3] Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982
- [4]Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER7E4 TRIBOLOGY	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. The basic objective of the subject is to deal fundamentals of friction, wear and lubrication.
2. The subject is useful in understanding the nature of surfaces of engineering materials.
3. The basic objective of the subject is to learn about types of lubricants.
4. The subject is useful in understanding the various tribological applications.

Pre requisite(s): Material Science, Machine Design I & II.

COURSE CONTENTS

UNIT- I

Fundamentals of Tribology: Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques, statistical description.

UNIT- II

Friction of Surfaces: Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods, friction of non metallic materials.

UNIT- III

Wear Mechanism: Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-IV

Theory of Lubrication: Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizes, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring, Additives in lubricants.

UNIT- V

Design for Tribological Elements: An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Basic Equation for fluid film lubrication Boundary lubrication, Hydrodynamic lubrication, elasto-hydrodynamic lubrication.

Learning Outcomes:

Upon completing the course, student will be able to:

- 1) Understand and importance of Tribological phenomenon
- 2) Optimize the friction and wear rate.
- 3) Understand the wear mechanism.
- 4) Determine the application of Lubricants.

BOOKS RECOMMENDED:

- [1] Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975
- [2] Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- [3] Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982
- [4] Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999.

LIST OF PRACTICAL ASSIGNMENTS

1. Performance analysis of Journal Bearings.
2. Experimental analysis of Lubricants.
3. Experimental analysis of Friction on different material.
4. Study of method for Wear Debris analysis.
5. Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME108 COMPUTATIONAL FLUID DYNAMICS	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	35	25	-	-	60

Objective and Pre requisites: The objective of the subject to introduce the students about the new and advanced methods in fluid dynamics using computer systems. Pre requisites are Engineering Mathematics, Fluid Mechanics & Thermodynamics.

COURSE CONTENT

UNIT 1

Introduction to Fluid Dynamics

Review of conservation equations, Continuum concept, control volume equations, Ideal fluid flow and hydraulic singularities, Navier-stokes equations, and their use. Concept of compressible flow, one dimensional isentropic flow, normal shock, flow with-friction, heat transfer, boundary-Layer theory and applications

UNIT 2

Boundary Layer Theory

Basic concepts, Boundary Layer Parameters, Boundary Layer on flat plate, Hiemenz flow, flow near rotating disc. Von-Karman Momentum Equation. General Properties of Boundary Layer equations, Theory of stability. Theory of similarity in heat transfer and exact solutions. Turbulence, correlation coefficient.

UNIT 3

Numerical Methods

Fluid Dynamics Equations in Eulerian systems, the characteristic method, finite element methods and application in fluid dynamics, solution of physical flow problems. Scaling and nondimensionalisation Order of Magnitude method.

UNIT 4

Computational Methods

Algebraic equations, ordinary differential equations, Numerical solutions of non-linear equation. Problems leading to system of linear equations. Techniques for solving system of linear equations (direct and iterative). Linear and non linear regression techniques to correlate experimental data. Numerical Integration, application to flow processes. Solution to partial differential equations, Difference forms, implicit and explicit methods for steady state and transient problems.

UNIT 5

Optimisation Methods

Classical optimization methods, unconstrained minimization. Univariate, conjugate direction, gradient and variable metric methods, constrained minimization, feasible direction and projections. Integer and Geometric programming, genetic algorithms.

BOOKS RECOMMENDED:

- [1] Douglas, J. F., *Fluid Mechanics*, Pearson Education, 2005.
- [2] Streeter, V. L and Wylie, E. B., *Fluid Mechanics*, McGraw-Hill Co, 2003.
- [3] Streeter, V. L and Wylie, E. B., *Fluid Dynamics*, McGraw-Hill Co, 2003.
- [4] White F., *Fundamentals of Fluid mechanics*, McGraw-Hill Co, 2003.
- [5] Wirz H.J. and Smolderen J.J., *Numerical Methods in Fluid Dynamics*, McGraw-Hill, 1978.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER7E5 Computational Fluid Dynamics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: The objective of the subject is to

1. Introduce the students about the new and advanced methods in fluid dynamics
2. Enable the students to use computer systems and related software for fluid dynamics.
3. Simulate the various flow conditions involving heat transfer and fluid flow.
4. Simulate the real life problems.

Pre requisite(s): Fluid Mechanics, Thermodynamics, Engineering Mathematics, Engineering Graphics

COURSE CONTENTS

UNIT I

Introduction to Fluid Dynamics: Review of conservation equations, Continuum concept, control volume equations, Ideal fluid flow and hydraulic singularities, Navier-stokes equations, and their use. Concept of compressible flow, one dimensional isentropic flow, normal shock, flow with-friction, heat transfer, boundary-Layer theory and applications

UNIT II

Boundary Layer Theory: Basic concepts, Boundary Layer Parameters, Boundary Layer on flat plate, Hiemenz flow, flow near rotating disc. Von-Karman Momentum Equation. General Properties of Boundary Layer equations, Theory of stability. Theory of similarity in heat transfer and exact solutions. Turbulence, correlation coefficient.

UNIT III

Numerical Methods: Fluid Dynamics Equations in Eulerian systems, the characteristic method, finite element methods and application in fluid dynamics, solution of physical flow problems. Scaling and nondimensionalisation Order of Magnitude method.

UNIT IV

Computational Methods: Algebraic equations, ordinary differential equations, Numerical solutions of non-linear equation. Problems leading to system of linear equations. Techniques for solving system of linear equations (direct and iterative). Linear and non linear regression techniques to correlate experimental data. Numerical Integration, application to flow processes. Solution to partial differential equations, Difference forms, implicit and explicit methods for steady state and transient problems.

UNIT V

Optimisation Methods: Classical optimization methods, unconstrained minimization. Univariate, conjugate direction, gradient and variable metric methods, constrained minimization, feasible direction and projections. Integer and Geometric programming, genetic algorithms.

Learning Outcomes:

1. Understand the various flow situations numerically
2. Analyse the flow patterns studied in fluid mechanics
3. Simulate the various flow situations
4. Apply optimisation methods to find most optimum solution.

BOOKS RECOMMENDED:

- [1] Anderson, J. D., *Computational Fluid Dynamics: The Basics with Applications*, Pearson Education, 2005.
- [2] Veerstig, H and W. Malasekra, E. B., *An Introduction to Computational Fluid Dynamics : The Finite Volume Method*, Pearson, 2e, 2009.
- [3] Streeter, V. L and Wylie, E. B., *Fluid Dynamics*, McGraw-Hill Co, 2003.
- [4] White F., *Fundamentals of Fluid mechanics*, McGraw-Hill Co, 2003.
- [5] Wirz H.J. and Smolderen J.J., *Numerical Methods in Fluid Dynamics*, McGraw-Hill, 1978.

LIST OF PRACTICAL ASSIGNMENTS

1. Introduction to CFD software.
 2. To simulate flow over the flat plate.
 3. To simulate flow over the cylinder.
 4. To simulate flow over an airfoil.
 5. To simulate flow through nozzles and diffusers.
 6. To simulate flow through Pipe of various cross-section.
 7. To simulate flow through convergent-divergent nozzle.
 8. To simulate flow across structural element.
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Devi Ahilya University, Indore India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours Per Week			Marks					
4ME151, PRODUCTION & OPERATIONS MANAGEMENT	L	T	P		TH	CW	SW	PR	Total
		4	-	-	Max.	100	50	-	-
Duration of Theory Paper 3 Hours				Min.	35	25	-	-	60

Objective and Pre requisites: The objective of the subject is to provide students with an understanding of the theory underlying operations management & enable them to contribute to improved operating decisions. This course has gradually incorporated an increasing amount of quantitative methodology because quantitative techniques improved decision making.

COURSE CONTENTS

UNIT- 1

Production Management

Definition: Production Management operation function in organizations, Systems view of operations, defining, managing the operations subsystems. Framework for managing operations. Forecasting in operations. Methods of Forecasting, selection of the Forecasting models. Need for facility location planning, factors affecting plant location decisions.

UNIT- 2

Operations Capacity and Layout Decisions

Capacity planning and environment. Strategies to modify the capacity in the short run & long run. Decision tree analysis, Layout concepts, developing the process layout models & behavior, developing the product layout models (Assembly line models & behavior), manufacturing cellular layouts.

UNIT- 3

Scheduling Systems and Aggregate Planning

Operations planning and scheduling systems, aggregate planning process, strategies for developing aggregate planning, master production schedule. Loading: various approaches of loading, Sequencing: priorities sequencing rules, detailed scheduling, Expediting.

UNIT- 4

MRP& Inventory Control

Types of inventory, various models of Inventory control for EOQ, EPQ, A B C & VED analysis.
MRP: Objectives, advantages, limitations, preparation of material requirement plan, closed loop MRP,
MRP- II, introduction to ERP & SCM.

UNIT- 5

Material, Maintenance & Economic Analysis

Introduction purchasing: Objectives, policies, procedure Maintenance: objectives, Importance and types of
Maintenance systems Preventive and breakdown maintenance. Economic Analysis: Time Value of Money
concept, Capital investment evaluation techniques- Pay back, NPV, IRR etc.

BOOKS RECOMMENDED:

- [1] Monks Joseph, *Operation management*, McGraw Hill international, 3e, 1987.
- [2] Everett E. Adam, et al, *Production & Operations Management*, Prentice – Hall of India, 5e, 2004.
- [3] Chase Richard B., et al, *Operations Management*, Tata MacGraw Hill, 11e, 2006
- [4] Agrawal R.D., *Organization & Management*, Tata MacGraw Hill.
- [5] Buffa E., *Production and Operation Management*, McGraw Hill,T/e
- [6] Martand Telsung, *Industrial Engineering & Production Management*, S.Chand & Co. Ltd, 2004.

Learning Objectives:

1. This course provides hands-on and real world experience in the development of innovative and realistic customer-driven engineered products.
2. Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to emphasize ingenuity
3. Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to provide wide coverage of engineering and business topics.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8C1 PRODUCTION & OPERATIONS MANAGEMENT	L	T	P	L	T	P	Total
	3	1	0	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) The objective of the subject is to provide students with an understanding of the theory underlying operations management
- 2) To enable students to contribute to improved operating decisions.
- 3) This course has gradually incorporated an increasing amount of quantitative methodology because quantitative techniques improved decision making.

Pre requisite(s): Industrial Engineering & Management, Materials Management, Operations Research.

COURSE CONTENTS

UNIT- I

PRODUCTION MANAGEMENT: Definition: Production Management operation function in organizations, Systems view of operations, defining, managing the operations subsystems. Framework for managing operations. Forecasting in operations. Methods of Forecasting, selection of the Forecasting models.

UNIT- II

OPERATIONS CAPACITY AND LAYOUT DECISIONS: Need for facility location planning, factors affecting plant location decisions.

Decision tree analysis, Layout concepts, developing the process layout models & behavior, developing the product layout models (Assembly line models & behavior), manufacturing cellular layouts.

UNIT- III

SCHEDULING SYSTEMS AND AGGREGATE PLANNING: Operations planning and scheduling systems, aggregate planning process, strategies for developing aggregate planning, master production schedule. Loading: various approaches of loading, Sequencing: priorities sequencing rules, detailed scheduling, Expediting.

UNIT- IV

MRP&CAPACITY PLANNING: MRP: Objectives, advantages, limitations, preparation of material requirement plan, closed loop MRP, MRP- II, Capacity planning and environment. Strategies to modify the capacity in the short run & long run.

Introduction to ERP.

UNIT- V

MATERIAL, MAINTENANCE & ECONOMIC ANALYSIS: Maintenance: objectives, Importance and types of Maintenance systems Preventive and breakdown maintenance. Economic Analysis: Time Value of Money concept, Capital investment evaluation techniques- Pay back, NPV, IRR etc.

Learning Outcomes:

Upon completing the course student will be able to:

1. Understand the fundamentals of Production & Operations Management.
2. Apply techniques of demand forecasting in practical situations.
3. Take decisions related to plant locations and plant layout.
4. Understand the basics of aggregate planning and scheduling systems.
5. Know the techniques related to materials requirement, maintenance of production system.

BOOKS RECOMMENDED:

- [1] Monks Joseph, *Operation management*, McGraw Hill international, 3e, 1987.
 - [2] Everett E. Adam, et al, *Production & Operations Management*, Prentice – Hall of India, 5e, 2004.
 - [3] Chase Richard B., et al, *Operations Management*, Tata MacGraw Hill, 11e, 2006
 - [4] Buffa E., *Production and Operation Management*, McGraw Hill, T/e
 - [5] Martand Telsung, *Industrial Engineering & Production Management*, S.Chand & Co. Ltd, 2004.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME153,VIBRATION & NOISE CONTROL	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
	Duration of Theory Paper: 3 Hours			Min	35	25	25	25	110

Objective of the subject:

Objective of the subject is to deal with study of basics of the vibrations in a body, analysis of vibration phenomenon, control of vibration in machine parts, balancing. The subject also deals with Introduction of basic terminology of noise engineering and noise control. The pre requisites are Dynamics of machine, Machine Design.

COURSE CONTENT

UNIT-1

Introduction

Periodical motion, harmonic motion, period, cycle, circular frequency, amplitude and phase angles of vibration motion, non-harmonic periodic motions. Harmonic analysis, the vector method of representing vibrations, displacement, velocity and acceleration in harmonic motion, super position of simple harmonic, beats, work done in harmonic motion .

UNIT-2

System with One Degree of Freedom

System having single degree of freedom, free vibration of systems without damping, equilibrium and energy method for determining natural frequency. Raleigh's method, equivalent systems (systems with compound spring, shafts of different dia. Equivalent length, effect of mass of springs and shaft). Free vibration of systems with viscous, coulomb and structural damping. Equations of motions-discussion of solutions.

Forced vibrations of systems with and without viscous and coulomb damping,, frequency response plots, Phase shift plots, Equivalent viscous damping, power consumption of vibration systems, forced isolation, commercial isolators, transmissibility.

UNIT-3

Systems with Two Degree of Freedom

System having two degree of freedom system, Normal mode of vibrations, Torsional systems, undamped & damped vibration in two degree of freedom system with free and forced vibration.Vehicle suspension, Undamped dynamic vibration absorber. Centrifugal absorber, friction damper. Vibration Instruments: Principle of frequency, Amplitude, Velocity and acceleration measuring instruments, Analysis of vibration records.

Electrical Analogies: Electric circuit principles, equivalent circuits.

UNIT-4

Whirling of Shafts

Whirling of light flexible shaft with an unbalance disk at the Centre of its length with and without damping, discussion of speeds above and below the critical speed, Uniform shaft with and without unbalanced masses attached along its length (by Reyleigh method) for simple supported and fixed ends.

UNIT-5

Noise Control

Noise and its causes, sound pressure /intensity/ power level and their interrelation, Decibel scale, Loudness and equal loudness contours, Sound spectra and octave band analysis. Background noise. Weighted networks. Measurement of noise, effect of machine/ process noise on operators, employees and local resident's, standard of noise level and exposure limits. Methods of industrial noise control.

BOOKS RECOMMENDED:

- [1] Ambekar A.G. “*Mechanical Vibrations and Noise Engineering*” Prentice-Hall of India, New-Delhi, 2e, 2006.
- [2] Singh V.P., “*Mechanical Vibration*” Dhanpat Rai & Co.(p)Ltd., Delhi, 3e, 2001
- [3] Thomson W.T “*Theory of Vibration with Application*” CBS Publishers & Distributors, Delhi, 3e, 1990.
- [4] Grover G.K. “*Mechanical Vibrations*” Nem Chand & Brothers, 2e, 2007.
- [5] Pujara K. “*Vibration & Noise for Engineers*”, Dhanpat Rai & Sons, Delhi, 2e, 1992.

LABORATORY EXPERIMENTS:

1. To find the natural frequency of a simple pendulum.
2. To determine the radius of gyration of a compound pendulum using vibration phenomenon.
3. To determine the radius of gyration of a body using bifilar suspension method..
4. To determine the radius of gyration of a body using trifilar suspension method.
5. To determine the natural frequency of a spring mass pulley system.
6. To determine natural frequency of a spring mass system.
7. To determine the natural frequency of an undamped forced vibration system. .
8. To determine the natural frequency of a two degree of freedom system.
9. Performance analysis of damped forced vibration system.
10. Performance analysis of undamped dynamic vibration absorber.
11. Study of Vibration measuring instruments.
12. To find out critical speed of shaft using whirling of shaft apparatus.
13. Study of sound level meter.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER8C2 VIBRATION & NOISE CONTROL	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5

Learning Objectives:

- Objective of the subject is to deal with study of basics of the vibrations in a body
- The main objective of the subject is to deal with study and analysis of vibration phenomenon, control of vibration in machine parts, balancing.
- The subject also deals with Introduction of basic terminology of noise engineering and noise control.
- The subject also deals with the Whirling of light flexible shaft.

Pre requisite(s): Dynamics of machine, Machine Design.

COURSE CONTENTS

UNIT-I

Introduction: Periodical motion, harmonic motion, period, cycle, circular frequency, amplitude and phase angles of vibration motion, non-harmonic periodic motions. **classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration** Harmonic analysis, the vector method of representing vibrations, displacement, velocity and acceleration in harmonic motion, super position of simple harmonic, beats, work done in harmonic motion .

UNIT-II

System with One Degree of Freedom: System having single degree of freedom, free vibration of systems without damping, equilibrium and energy method for determining natural frequency. Raleigh's method, equivalent systems (systems with compound spring, shafts of different dia. Equivalent length, effect of mass of springs and shaft). Free vibration of systems with viscous, coulomb and structural damping. Equations of motions-discussion of solutions. Forced vibrations of systems with and without viscous and coulomb damping,, frequency response plots, Phase shift plots, Equivalent viscous damping, power consumption of vibration systems, forced isolation, commercial isolators, transmissibility.

UNIT-III

Systems with Two Degree of Freedom: System having two degree of freedom system, Normal mode of vibrations, Torsional systems, undamped & damped vibration in two degree of freedom system with free and forced vibration. Vehicle suspension, Undamped dynamic vibration absorber. Centrifugal absorber, friction damper. Vibration Instruments: Principle of frequency, Amplitude, Velocity and acceleration measuring instruments, Analysis of vibration records. Electrical Analogies: Electric circuit principles, equivalent circuits.

UNIT-IV

Whirling of Shafts: Whirling of light flexible shaft with an unbalance disk at the Centre of its length with and without damping, discussion of speeds above and below the critical speed, Uniform shaft with and without unbalanced masses attached along its length (by Rayleigh method) for simple supported and fixed ends.

UNIT-V

Noise Control: Noise and its causes, sound pressure /intensity/ power level and their interrelation, Decibel scale, Loudness and equal loudness contours, Sound spectra and octave band analysis. Background noise. Weighted networks. Measurement of noise, effect of machine/ process noise on operators, employees and local resident's, standard of noise level and exposure limits. Methods of industrial noise control.

Learning Outcomes:

Upon completing the course student will be able to:

1. Understand the basic phenomenon of Vibration and Noise.
2. Find the natural frequency of different mechanical systems.
3. Find out the performance of viscous dampers in force vibration system.
4. Correlate the Mechanical and Electrical System.
5. Control the noise from the Mechanical System.

BOOKS RECOMMENDED:

- [1] Ambekar A.G. "*Mechanical Vibrations and Noise Engineering*" Prentice-Hall of India, New-Delhi, 2e, 2006.
- [2] Singh V.P., "*Mechanical Vibration*" Dhanpat Rai & Co.(p)Ltd., Delhi, 3e, 2001
- [3] Thomson W.T "*Theory of Vibration with Application*" CBS Publishers & Distributors, Delhi, 3e, 1990.
- [4] Grover G.K. "*Mechanical Vibrations*" Nem Chand & Brothers, 2e, 2007.
- [5] Pujara K. "*Vibration & Noise for Engineers*", Dhanpat Rai & Sons, Delhi, 2e, 1992.

LIST OF PRACTICAL ASSIGNMENTS

1. To find the natural frequency of a simple pendulum.
 2. To determine the radius of gyration of a compound pendulum using vibration phenomenon.
 3. To determine the radius of gyration of a body using bifilar suspension method.
 4. To determine the radius of gyration of a body using trifilar suspension method.
 5. To determine the natural frequency of a spring mass pulley system.
 6. To determine natural frequency of a spring mass system.
 7. To determine the natural frequency of an undamped forced vibration system. .
 8. To determine the natural frequency of a two degree of freedom system.
 9. Performance analysis of damped forced vibration system.
 10. Performance analysis of undamped dynamic vibration absorber.
 11. Study of Vibration measuring instruments.
 12. To find out critical speed of shaft using whirling of shaft apparatus.
 13. Study of sound level meter.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				B.E. IV year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours Per Week			Marks					
4ME156, AUTOMOBILE ENGINEERING	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max.	100	50	50	50	250
Duration of Theory Paper 3 Hours				Min.	35	25	25	25	110

Objectives & Pre requisites: To understand the principles and working of different systems of automobiles. Engineering Mechanics, Theory of Machines.

COURSE CONTENT

UNIT-1

Chassis and Body Engineering

Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, ~~Location of engine, Front wheel and rear wheel drive,~~ Performance of Vehicle.

UNIT-2

Steering System

Front axle beam, Stub axle, Front wheel assembly, Principles of types of wheel alignment, Front wheel geometry viz. camber, Kingpin inclination, Castor, Toe-in and Toe-out, Condition for true rolling motion, Centre point steering, Directional stability of vehicles, Steering Gears , Power steering, Slip angle, Cornering power, Over steer & Under Steer. Wheels and tyres , Specifications, Types, Construction and tread pattern.

UNIT-3

Suspension System

Vehicle Dynamics and requirement of suspension , Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, ABS, Performance- Braking efforts, Efficiency, Stopping Distance& time, tendency of over turning.

UNIT-4

Transmission System

Clutches-requirement, Types and construction, Gear boxes-purpose, Types and construction, Synchronizer, Gear shifter mechanism, Determination of gear ratio for vehicles, Gear box performance at different vehicle speed, Automatic transmission, Torque converters, Fluid coupling, Propeller shaft, Universal joints, CV joints, Differential gear box, Rear axle types & construction.

UNIT-V

Electrical and Control Systems

Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Different Bendix drive systems, Starter relay switch, Electric fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Battery operated vehicles. Microprocessor based control system for automobiles. Intelligent automobiles control systems.

General: Car air conditioning systems and components, Indian standards for automotive vehicles exhaust emission-Bharat and Euro norms, Indian Motor vehicle act- preliminary information

BOOKS RECOMMENDED:

- [1] Singh Kirpal, *Automobile Engineering, Vol.1*, Standard Pub, 9e
- [2] Giri N.K., *Automotive Technology*, Khanna Pub, 4e 2009
- [3] Newton & Steeds, *Automobile Engineering*, Butterworth Int.
- [4] Heitner Joseph, *Automotive Mechanics, Principles and Practices*, East-West Pub.
- [5] Crouse W.H., *Automotive series Part-I to VI*, Tata McGrawhill, 9e
- [6] Crouse W.H., *Automotive Emission*, Tata McGrawhill
- [7] BIS and Euro –I and Euro-II, *Emission standards*.

LABORATORY EXPERIMENTS

1. Study of chassis frame and body.
2. Study of steering linkage mechanism and Steering Boxes.
3. Study of Front and Rear suspension systems.
4. Study of hydraulic brake system.
5. Study of single plate clutch.
6. Study of sliding mesh, constant mesh, synchromesh gearboxes.
7. Study of transmission system-Propeller shaft, Differential, Rear axles.
8. Study of electrical circuit and, battery.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8C3 AUTOMOBILE ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) To understand the principles and working of different systems of automobiles.
- 2) To understand the principles and design of different systems of automobiles.
- 3) To understand the principles and working of Microprocessor based automobiles.
- 4) To understand the principles and working of Electrical systems of automobiles.

Pre requisite(s): IC Engines, Theory of Machines, Dynamics of Machines, Engineering Mechanics.

COURSE CONTENTS

UNIT-I

Chassis and Body Engineering: Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Chassis layout, layout of an automobile with reference to engine location, stability of vehicles, structural dynamics, Performance of Vehicle, types of automobiles.

UNIT-II

Steering System: Front axle beam, Stub axle, Front wheel assembly, Principles of types of wheel alignment, Front wheel geometry viz. camber, Kingpin inclination, Castor, Toe-in and Toe-out, Condition for true rolling motion, Centre point steering, Directional stability of vehicles, Steering Gears, Power steering, Slip angle, Cornering power, Over steer & Under Steer, electronic steering control, Wheels and tyres Specifications, Types, Construction and tread pattern.

UNIT-III

Suspension System: Vehicle Dynamics and requirement of suspension, Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, electronic suspension system, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, Antilock braking system, Performance- Braking efforts, Efficiency, Stopping Distance & time, traction control system,

UNIT-IV

Transmission System: Clutches-requirement, Types and construction, Various Resistances to Motion of Automobile, Traction, tractive effort Performance curves, Need for transmissions, Types and construction, Synchronizer, Gear shifter mechanism, Determination of gear ratio for vehicles, Gear box performance at different vehicle speed, Torque converters, Fluid coupling, Automatic transmission, epicyclic and hydromatic transmission – continuously variable transmission (Continuous Variable Transmission – CVT), Electrical drives: advantages and limitations, Modern electric drive for buses and performance characteristics, Propeller shaft, Universal joints, CV joints, Differential gear box, Rear axle types & construction.

UNIT-V

Electrical and Control Systems: Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Different Bendix drive systems, Starter relay switch, Electrical accessories -fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Car air conditioning systems, Battery

operated vehicles. Microprocessor based control system for automobiles. Intelligent automobiles control systems.

Indian standards for automotive vehicles exhaust emission-Bharat and Euro norms, Indian Motor vehicle act- preliminary information.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Understand the design and working principles of Chassis systems of automobiles.
- 2) Understand the specifications of automobiles.
- 3) Understand the working of all systems of automobiles.
- 4) Learn advanced system of automobiles.
- 5) Industry ready for Automotive industry.

BOOKS RECOMMENDED:

- [1] Singh Kirpal, *Automobile Engineering, Vol.1*, Standard Pub, 9e.
- [2] Giri N.K., *Automotive Technology*, Khanna Pub, 4e 2009.
- [3] Newton & Steeds, *Automobile Engineering*, Butterworth Int.
- [4] Heitner Joseph, *Automotive Mechanics, Principles and Practices*, East-West Pub.
- [5] Crouse W.H., *Automotive series Part-I to VI*, Tata McGrawhill, 9.e
- [6] Crouse W.H., *Automotive Emission*, Tata McGrawhill.
- [7] BIS and Euro –I and Euro-II, *Emission standards*.

LIST OF PRACTICAL ASSIGNMENTS:

1. Study of chassis frame and body.
 2. Study by dismantling and assembly of steering linkage mechanism and Steering Boxes.
 3. Study by dismantling and assembly of Front and Rear suspension systems.
 4. Study by dismantling and assembly of hydraulic brake and power brake system.
 5. Study by dismantling and assembly of single plate and multi plate clutch system.
 6. Study by dismantling and assembly of sliding mesh, constant mesh, synchromesh gearboxes.
 7. Study by dismantling and assembly of -Propeller shaft, Differential, Rear axles.
 8. Study of electrical circuit, self-starter and battery.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME152,CAD/CAM	L	T	P		TH	CW	SW	PR	Total
	4	0	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective and Pre requisites: The course contents are aimed at providing the fundamental concepts of CAD/CAM and its tools to the undergraduate students of mechanical engineering. Prerequisites to this course are Engineering Drawing, Manufacturing Processes, Machine Design and Drawing and Production Engineering-I.

COURSE CONTENT

UNIT-1

Fundamentals of CAD/CAM

Introduction to CAD/CAM, CAE, CIM, Concurrent Engineering and Reverse Engineering. Computer Graphics: 2D and 3D Transformation, Concatenation. CAD/CAM Hardware: CAD/CAM workstations, Peripheral devices including ~~input-output and storage devices~~. CAD/CAM Softwares.

UNIT-2

Computer Aided Design

Introduction to design process, Typical product life cycle, Areas of applications and benefits of CAD. Geometric Modeling: Wireframe and surface modeling, Parametric representation of analytical and synthetic curves and surfaces, Solid Modeling: Boundary representation, Constructive solid geometry, Parametric and variational modeling, CAD/CAM data exchange, ~~Introduction to finite element analysis~~.

UNIT-3

Computer Aided Manufacturing

Introduction to CAM, Fundamentals of numerical control and computer numerical control systems, Coordinate systems, Motion and position control, Part Programming: Manual part programming, ~~NC Codes and standards~~, Computer assisted part programming using APT language, ~~Simulation of machining of 3D models using CAD/CAM software, Pocket machining and surface machining methods~~.

UNIT-4

Rapid Prototyping Technologies and Robotics

Introduction of basic RP techniques: StereoLithography, Selective Photo Curing, Selective Layer Sintering, Fused Deposition Modeling, Laminated Object Manufacturing, 3D Printing, Applications of RP techniques. Robotics: Robot configurations, Motion and position control of robot arm, Robot applications.

UNIT-5

Group Technology and FMS

Introduction to the concept of group technology, Part classification and coding systems, Machine cell formation, Introduction to Flexible Manufacturing Systems: Types of FMS and components of FMS. ~~Automated storage and retrieval Systems AS/RS, Automated guided vehicles (AGV), CAPP, Computer aided inspection and quality control (CAIQC).~~

BOOKS RECOMMENDED:

- [1] Groover and Zimmers, *CAD/CAM: Computer Aided Design and Manufacturing*, PHI Private Limited.
- [2] Groover Mikell P, *Automation, Production Systems and Computer Integrated Manufacturing*, 2e, PHI Private Limited.
- [3] Zeid Ibrahim, *Mastering CAD/CAM* Tata McGraw-Hill Edition, Tata McGraw-Hill Publishing Company Limited.
- [4] Rao P.N., *CAD/CAM Principles and Applications*, 2e, Tata McGraw-Hill Publishing Company Limited.
- [5] ~~Zeid Ibrahim, R. Sivasubramanian, *CAD/CAM Theory and Practice*, Revised First Edition, — Tata McGraw Hill Publishing Company Limited.~~

LABORATORY EXPERIMENTS:

1. Development of 3D CAD model of a part as per given drawing using a CAD software.
2. Creating Assembly of given parts using a CAD software.
3. Development of the Drawing Views of a given part using a CAD software.
4. Study of the constructional features of the CNC Trainer Lathe.
5. Part Programming for the CNC machining of a workpart as per given drawing.
6. ~~Simulation of the CNC machining operations using a CAM software.~~
7. Machining of a given workpiece as per drawing on CNC lathe.
8. ~~Study of the CAD/CAM hardware and software.~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER8E1 CAD/CAM	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hrs							

Learning Objectives:

- 1) To understand the basics of CAD/CAM.
- 2) To understand the concepts of computer graphics and its tools.
- 3) To learn about the geometric modeling techniques concerned to the manufacturing of parts.
- 4) To understand the latest advances in the manufacturing methods.

Prerequisite(s): Engineering Drawing, Machine Design & Drawing.

COURSE CONTENTS

UNIT-I

Fundamentals of CAD\CAM: Introduction to CAD\CAM, CIM, CAE, Reverse Engineering, Concurrent/Simultaneous Engineering.

Hardware: Types of Computer Systems, Workstations, Peripheral Devices, Storage Devices, CPU.

Computer Graphics: 2D & 3D Transformations, Concatenations.

CAD/CAM Software Features & its Organizations.

UNIT-II

Computer Aided Design: Introduction to Design process, Product Life Cycle, Areas of Applications and benefits of CAD. Geometrical Modeling: Wire frame and Surface Modeling - Parametric representation of Analytical and Synthetic Curves and Surfaces, Solid Modeling - Boundary representation, Constructive Solid Geometry. Parametric & Variational Modeling.

CAD/CAM Data Exchange Standards.

UNIT-III

Computer Aided Manufacturing: Introduction to CAM, Fundamentals of Numerical Control and Computer Numerical Control Systems: Coordinate Systems, Motion and Position Control.

CNC Control Systems: Direct Numerical Control and Distributed Numerical Control, Adaptive Control.

Part Programming Methods: CNC Codes & Standards, Manual Programming, Computer Assisted Part Programming, APT language.

UNIT-IV

Rapid Prototyping Technologies and Robotics: Basic RP Techniques: Stereo Lithography, Selective Photo Curing, Selective Sintering, Fused Deposition Modeling, Laminated Object Manufacturing, 3D Printing, Application of RP Techniques, RP Methodology. Rapid Tooling.

Robot Configurations, Motion and Position Control of Robot Arm, Robot Applications.

UNIT-V

Group Technology and FMS: Introduction to Group Technology Concept, Part Classification & Coding Systems, Machine Cell Formations, Introduction to Flexible Manufacturing Systems: Concept, Components and Types, CAPP and its types, Computer Aided Inspection and Quality Control.

Learning Outcomes:

Upon Completing the Course, Student will be able to:

- 1) Understand the importance of CAD/CAM principles in the Product development.
- 2) Develop programs related to manufacturing using codes.
- 3) Analyse the importance of networking in manufacturing environment.

BOOKS RECOMMENDED:

- [1]. Groover and Zimmers, *CAD/CAM: Computer Aided Design and Manufacturing*, PHI Pvt. Ltd., New Delhi.
- [2]. Groover Mikell P, *Automation, Production Systems and Computer Integrated Manufacturing*, PHI Pvt. Ltd., New Delhi.
- [3]. Zeid Ibrahim, *Mastering CAD/CAM*, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- [4]. Rao P. N., *CAD/CAM Principles and Applications*, Tata McGraw Hill Publishing Company Ltd., New Delhi, Second Edition.

LIST OF PRACTICAL ASSIGNMENTS

- 1) Introduction to CAD/CAM Software (Proe, etc) and understanding its UI and Tools.
 - 2) To Perform Wireframe Modeling using Sketching tool.
 - 3) To Model a 3D Solids (Gears, Pulleys, Keys, Cotters, Shaft etc.).
 - 4) To Perform Surface Modeling.
 - 5) To Create 2D drawing from 3D part generated as above.
 - 6) To Create Assembly of Parts.
 - 7) To Simulate the assembly and create the exploded views.
 - 8) To Generate Automated CNC Tool Path and G-Code from Modeled Part.
 - 9) To Study the Constructional Features of the CNC Trainer Lathe.
 - 10) To create G Code and M Code program for CNC Lathe and Mill Machine.
-

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name	Instruction Hours per Week			Marks					
4ME154 RELIABILITY ENGINEERING	L	T	P		TH	CW	SW	PR	Total
	4	-	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective and Pre requisites: The objective of the subject to introduce the students about the new and advanced methods of problem solving skill by Reliability Engineering.

COURSE CONTENT

UNIT-1

Introduction

Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.

UNIT-2

Theory of Reliability

Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

UNIT-3

Reliability Mathematics

Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis Procedures, empirical reliability calculations.

UNIT-4

Optimum based Design

Introduction to optimum design, analysis of simple machine members based on optimum design. System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

UNIT-5

Reliability Improvements & Testing

Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series – parallel, stand by and hybrid, effect of maintenance.

Note: Only Data-books, Reliability Tables and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Billintan R.& Allan R.N., *Reliability Evaluation of Engineering and Systems*, Plenum Press,2003.
- [2] Kapoor. K.C., *Reliability in Engineering and Design*, John Wiely and Sons, 2001.
- [3] Sinha S.K., *Life Testing and Reliability Estimation*, Wiely Eastern Ltd, 2003.
- [4]Shooman M.L., *Probabilistic Reliability, An Engineering Approach*, McGraw Hill, 1998.
- [5] Sandler G.H., *System Reliability Engineering*, Prentice Hall, 2001.

LABORATORY EXPERIMENTS:

1. Design Analysis of Reliability of M/c component.
2. Problem based on Markov method of Reliability.
3. Optimum Design of M/c component.
4. Problem based on Weibull analysis of Reliability.
5. Problem based on Statistical analysis.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
MER8E2 RELIABILITY ENGINEERING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) The objective of the subject is to acquaint the students about the Theory of Reliability.
- 2) The objective of the subject is to acquaint the students about design optimization of mechanical component.
- 3) The objective of the subject is to acquaint the students about the Statistical analysis.

Pre requisite(s): Machine Design, Mathematics I, II, III & IV.

COURSE CONTENTS

UNIT-I

Introduction

Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.

UNIT-II

Theory of Reliability

Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

UNIT-III

Reliability Mathematics

Definition of probability, laws of probability, conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis Procedures, empirical reliability calculations.

UNIT-IV

Optimum based Design

Introduction to optimum design, analysis of simple machine members based on optimum design. System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimension.

UNIT-V

Reliability Improvements & Testing

Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series – parallel, stand by and hybrid, effect of maintenance.

Note: Only Data-books, Reliability Tables and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Billintan R.& Allan R.N., *Reliability Evaluation of Engineering and Systems*, Plenum Press,2003.
- [2] Kapoor. K.C., *Reliability in Engineering and Design*, John Wiely and Sons, 2001.
- [3] Sinha S.K., *Life Testing and Reliability Estimation*, Wiely Eastern Ltd, 2003.
- [4]Shooman M.L., *Probabilistic Reliability, An Engineering Approach*, McGraw Hill, 1998.
- [5] Sandler G.H., *System Reliability Engineering*, Prentice Hall, 2001.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Understand the principal of Reliability.
- 2) Understand the design optimization of mechanical component.
- 3) Understand the Weibull analysis, dimensioning.

LIST OF PRACTICAL ASSIGNMENTS

1. Design Analysis of Reliability of M/c component.
 2. Problem based on Markov method of Reliability.
 3. Optimum Design of M/c component.
 4. Problem based on Weibull analysis of Reliability.
 5. Problem based on Statistical analysis.
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Devi Ahilya University, Indore India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)						
Subject Code & Name		Instruction Hours Per Week			Marks					
4ME155 PRODUCT DEVELOPMENT		L	T	P		TH	CW	SW	PR	Total
		4	0	2	Max.	100	50	50	50	250
Duration of Theory Paper 3 Hours					Min.	35	25	25	25	110

Objective and Pre requisites: This course provides hands-on and real world experience in the development of innovative and realistic customer-driven engineered products. Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to emphasize ingenuity and provide wide coverage of engineering and business topics.

COURSE CONTENTS

UNIT- 1

Introduction

Definitions, market needs, product cycle, design methodologies, product specification, conceptual and development phases. Product planning and design decision making. Marketing, forecasting & market research for a new product. Purchasing and sales procedure. Demand analysis for new product.

UNIT- 2

Product Design

Introduction to PD, Applications, Relevance, Product Definition, Scope, Terminology. Design definitions, the role and nature of design, old and new design methods, Design by evolution. Need based development, technology based developments. Physical reliability & Economic feasibility of design concepts.

UNIT- 3

Development of Prototype Product

Divergent, transformation and convergent phases of product design. Identification of need, Analysis of need. Design for what? Design criteria, functional aspects. Aesthetics, ergonomics, form (structure). Shape, size, color. Mental blocks, Removal of blocks, Ideation Techniques, Creativity.

UNIT- 4

Transformations

Brainstorming & Synectics . Morphological techniques. Utility concept, Utility value, Utility index . Decision making under multiple criteria. Economic aspects of design. Fixed and variable costs. Break-Even Analysis.

UNIT- 5

Product Appraisal

Information and literature search, patents, standards and codes. Environment and safety considerations. Existing techniques such as work-study, SQC etc. which could be used to improve method & quality of product. Innovation versus Invention. Technological Forecasting.

BOOKS RECOMMENDED:

- [1] Chitale A.K. & Gupta R.C., Product Design & Manufacturing, PHI (EEE),1e, 2007.
- [2] Crewford R.P., The Technology of Creation Thinking, Prentice Hall, 2e,2004.
- [3] Walls Grohem, The Art of Thought, Bruce & Co., New York.
- [4] Starr M.K., Product Design & Decision Theory, Prentice Hall,2e, 2006.
- [5] Cain C .D., Engineering Product Design , Bussiness Books.

LABORATORY EXPERIMENTS:

- (1) Study and Analysis of product cycle of different product.
- (2) Study and Analysis of forecasting & market research methods for a new product.
- (3) Case studies related to Product Design applications.
- (4) Case studies related to Prototype Development methods for new product.
- (5) Analysis of methods related to transformation of Product idea into product concept & Prototype development.
- (6) Case studies related to standards and codes for product development.
- (7) Case studies related to Environment and safety considerations for product development
- (8) Case studies related to Technological Forecasting for product development.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			IV Year B.E. (Mechanical Engg.) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E3 PRODUCT DEVELOPMENT	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) This course provides hands-on and real world experience in the development of innovative and realistic customer-driven engineered products.
- 2) Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to emphasize ingenuity
- 3) Design concepts and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to provide wide coverage of engineering and business topics.

Pre requisites: Industrial Engineering & Management, Materials Management, Operations Research.

COURSE CONTENTS

UNIT- I

Introduction

Definitions, market needs, product cycle, design methodologies, product specification, conceptual and development phases. Product planning and design decision making. Marketing, forecasting & market research for a new product. Purchasing and sales procedure. Demand analysis for new product.

UNIT- II

Product Design

Introduction to PD, Applications, Relevance, Product Definition, Scope, Terminology. Design definitions, the role and nature of design, old and new design methods, Design by evolution. Need based development, technology based developments. Physical reliability & Economic feasibility of design concepts.

UNIT- III

Development of Prototype Product

Divergent, transformation and convergent phases of product design. Identification of need, Analysis of need. Design for what? Design criteria, functional aspects. Aesthetics, ergonomics, form (structure). Shape, size, color. Mental blocks, Removal of blocks, Ideation Techniques, Creativity.

UNIT- IV

Transformations

Brainstorming & Synectics . Morphological techniques. Utility concept, Utility value, Utility index . Decision making under multiple criteria. Economic aspects of design. Fixed and variable costs. Break-Even Analysis.

UNIT- V

Product Appraisal

Information and literature search, patents, standards and codes. Environment and safety considerations. Existing techniques such as work-study, SQC etc. which could be used to improve method & quality of product. Innovation versus Invention. Technological Forecasting.

Learning Outcomes:

Upon completing the course student will be able to:

- 1) Understand the fundamentals of product cycle.
- 2) Apply techniques of demand forecasting in practical situations.
- 3) Understand the phenomenon of prototype product
- 4) Know the basics of techniques related product development.
- 5) Know the various standard procedures related to patenting, environmental and other standards for product appraisal.

BOOKS RECOMMENDED:

- [1] Chitale A.K. & Gupta R.C., Product Design & Manufacturing, PHI (EEE),1e, 2007.
- [2] Crewford R.P., The Technology of Creation Thinking, Prentice Hall, 2e,2004.
- [3] Walls Grohem, The Art of Thought, Bruce & Co., New York.
- [4] Starr M.K., Product Design & Decision Theory, Prentice Hall,2e, 2006.
- [5] Cain C .D., Engineering Product Design , Bussiness Books.
- [6] Ulrich, K.T. and Eppinger, S.D., Product Design and Development, McGraw-Hill/Irwin, 4th ed, 2007 (ISBN 978-0073101422).

LIST OF PRACTICAL ASSIGNMENTS:

- (1) Study and Analysis of product cycle of different product.
- (2) Study and Analysis of forecasting & market research methods for a new product.
- (3) Case studies related to Product Design applications.
- (4) Case studies related to Prototype Development methods for new product.
- (5) Analysis of methods related to transformation of Product idea into product concept & Prototype development.
- (6) Case studies related to standards and codes for product development.
- (7) Case studies related to Environment and safety considerations for product development
- (8) Case studies related to Technological Forecasting for product development.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Mechanical Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
MER8E4 POWER PLANT ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- 1) The objective of the subject is to acquaint the students about the new and advanced technologies of power generation.
- 2) The objective of the subject is to acquaint the students about the new and advanced technologies of energy scenario.

Pre requisite(s): Steam Engineering, Thermodynamic Power Cycles.

COURSE CONTENTS

UNIT-I

Introduction

Review of world and Indian energy situation in respect of demand, supply and resources in the historic context. Primary and secondary energy sources, their interconvertibility Merits and Demerits and Criterion for selection of power plants.

UNIT-II

Steam Power Plant

Basic principles of siting and station design, Effect of climatic factors on station and equipment design, Choice of steam cycle and main equipment, Recent trends in turbine and boiler sizes and steam conditions, plant design and layout, Outdoor and indoor plant, System components, Fuel handling, Burning systems, Element of feed water treatment plant, Condensing plant and circulating water systems, Cooling towers, Turbine room and auxiliary plant equipment., Instrumentation, Testing and plant heat balance.

UNIT-III

Nuclear Power Plant

Importance of nuclear power development in the world and Indian context, Review of atomic structure and radio activity, Binding energy concept, Fission and fusion reaction, Fissionable and fertile materials, Thermal neutron fission, Important nuclear fuels, Moderators and coolants, their relative merits, Thermal and fast breeder reactors, Principles of reactor control, Safety and reliability features.

UNIT-IV

Hydro-Power Plant: Elements of Hydrological computations, Rainfall run off, Flow and power duration curves, Mass curves, Storage capacity, Salient features of various types of hydro stations, Component such as dams, Spillways, Intake systems, Head works, Pressure tunnels, Penstocks, Reservoir, Balancing reservoirs, Selection of hydraulic turbines for power stations, Selection of site.

UNIT-V

Diesel Engine and gas turbine power plants: Applications of diesel engines in power field, Types of diesel plants, Layout of a diesel engine power plant, Components of gas turbine plant, Gas turbine fuels, Gas turbine materials, Performance of gas turbine power plants.

Learning Outcomes:

Upon Completing the Course, Student will able to:

- 1) Understand the phenomenon of compressible liquids.
- 2) Understand the phenomenon of flow through nozzles & diffusers.
- 3) Understand the phenomenon of sound waves.
- 4) Understand the phenomenon of shock waves.
- 5) Understand the principles of Flow in constant area ducts with friction.

BOOKS RECOMMENDED:

- [1] Nag, P.K., Power Plant Engineering, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2008.
- [2] Arora and Domkundwar, A course in power Plant Engineering, Dhanpat Rai and CO, 2005.
- [3] EMI Wakil, Power Plant Technology, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2005.
- [4] Sharma PC, Power plant Engineering, Kataria and sons, Delhi.

LIST OF PRACTICAL ASSIGNMENTS

1. Study of Steam Power Plant.
 2. Study of Nuclear Power Plant.
 3. Study of Hydro-Power Plant.
 4. Study of Gas Turbine Power Plants.
 5. Study of Diesel Engine Power Plant.
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE IV Year (Mechanical Engineering)					
Subject Code & Name		Instruction Hours per Week			Marks				
4ME158 GAS DYNAMICS	L	T	P		TH	CW	SW	PR	Total
	4	-	-	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

Objective and Pre requisites: The objective of the subject is to acquaint the students about the fundamental principles of fluid mechanics, thermodynamics, compressibility, different types of flows and compressible flow analysis and utilization in engineering applications. Prerequisites are fluid mechanics, thermodynamics, Heat transfer.

COURSE CONTENT

UNIT-1

Introduction

Compressible flow, energy equation, rate equations for control volume, speed of sound –in ideal and perfect gases, in real gases, in almost compressible liquid, in solids, in two phase medium.

UNIT-2

Isentropic Flow with variable area

Comparison of isentropic and adiabatic processes, Mach number variation, stagnation and critical states, Area ratio as function of Mach number, impulse function, Mass flow rate, flow through nozzles, flow through diffusers.

UNIT-3

Flow with Normal Shock Waves

Wave Motion- Wave propagation in an elastic solid medium, sound waves, pressure waves, expansion waves. Development of shock waves, rarefaction waves, governing equations, Prandtl-Mayer relation Mach no. downstream of normal shock wave, static pressure ratio across the shock, temperature ratio across the shock, density ratio across the shock, stagnation pressure ratio across the shock, change in entropy across the shock, impossibility of shock in subsonic flow, strength of a shock wave Moving normal shock waves.

UNIT-4

Flow with oblique shock wave

Nature of flow, fundamental relations, Prandtl equation, Rankine-Hugoniot equation, Oblique shock relations, Mach Waves.

UNIT-5

Flow in constant area ducts with friction

Fanno curves, flow equations, solution of Fanno flow equations, variation of flow properties and Mach no. with duct length, Isothermal flow.

Flow in constant area duct with heat transfer

Reyleigh line, fundamental equations, Reyleigh flow relations, variation of flow properties, Maximum heat transfer.

BOOKS RECOMMENDED:

- [1] Bird G. A., *Molecular Gas Dynamics and the Direct Simulation of Gas Flows*, Oxford University.
- [2] Carlo C., *Kinetic Theory and Gas Dynamics*, Springer Verlag.
- [3] Liepmann H., *Elements of Gas Dynamics*, Dover Publication.
- [4] E. Rathakrishnan *Gas Dynamics* Prentice Hall of India.
- [5] S.M.Yahya, *fundamentals of compressible flow*, Wiley Eastern Limited New Delhi

LABORATORY EXPERIMENTS:

1. Analysis of Mass flow rate through nozzles.
2. Study of variation of flow properties and Mach no. with duct length
3. Analysis of Heat Transfer through constant area duct.
4. Study & Analysis of Heat Transfer through fins.
5. Analysis of friction loss through constant area ducts.

Academic Year: July-2015 to June-2016

Programme: B.E- I (FT)

Branch : All Branches

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	IAM001	Applied Mathematics-I	AMR1C1	Applied Mathematics-I	25%
2	IAC052	Chemistry & Environment Science	ACR1C2	Chemistry & Environment Science	25%
3	IME053	Elements of Mechanical Engg	MER1C3	Elements of Mechanical Engineering	15%
4	IET054	Basic Electronics	ETR1C4	Basic Electronics	40%
5	IME056	Workshop Practice	MER1C5	Workshop Practice	0%
6	ISS055	Technical English	SSR1S1	Technical English	25%
7	IAM051	Applied Mathematics-II	AMR2C1	Applied Mathematics-II	30%
8	IAP002	Applied Physics	APR2C2	Applied Physics	20%
9	IME003	Engineering Drawing	MER2C3	Engineering Drawing	10%
10	IEI004	Electrical Engineering	EIR2C4	Electrical Engineering	0%
11	ICO005	Computer Programming	COR2C5	Computer Programming in C++	40%
12	ISS006	Humanities	SSR2S2	Humanities	75%
				Average % change =	25%
				Average % change in BE program = Total average / 4 =	6.25%

Group-A
Group-B

S.V. Zobelcar
5-12-18

Shan. 5/12/18
Mehar 5/12/18
Janki 5/12/18
Bansode 5/12/18
S/ie
E

GROUP-A

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week		Marks						
1AM001 Applied Mathematics-I		L	T	P	TH	CW	SW	PR	Total	
Duration of Theory Paper: 3 Hours		4	-	-	Max	100	50	-	-	150
					Min	35	25	-	-	60

Course Objectives: To introduce the mathematical concepts of calculus for solving engineering problems that shall be used in various branches of engineering.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Differential Calculus: Expansion of functions by Taylor's and Maclaurin's Theorem; ~~Indeterminate forms; Tangents and Normals.~~

Application: Curvature in Cartesian and Polar Coordinates; Asymptotes; Envelopes; Evolutes and Involutives.

Unit-II

Integral Calculus: ~~Integration of Irrational and Transcendental Functions; Reduction Formulae; Integral as the limit of a Sum; Definite Integral and Properties.~~

Application: Area; Length of Curve; Volume; Surface of Revolution; Theorem of Pappus and Guldin.

Unit-III

Advanced Differential Calculus: Function of Several Variables; Partial Differentiation; Jacobians; Taylor's Series of Two Variables.

Application: Maxima and Minima of Function of Two and More Variables; Lagrange's Method of Undetermined Multipliers.

Unit-IV

Advanced Integral Calculus: Multiple integrals: Double and Triple Integration; Change of Order of Integration.

Application: Area; Volume; Centre of Gravity; Moment of Inertia.

Unit-V

Vector Calculus-I: Differentiation of a Vector; Gradient; Divergence and Curl.

Vector Calculus-II: Integration of a Vector Function; Gauss's, Green's and Stoke's Theorems.

BOOKS RECOMMENDED

- [1] E Mendelson, G J Hademenos, F Ayres, *Schaum's Easy Outline: Calculus*, McGraw-Hill, 2000.
- [2] R C Wrede, M Spiegel, *Schaum's Outline of Advanced Calculus*, 2/e, McGraw-Hill, 2002.
- [3] B.S.Grewal, *Engineering Mathematics*, 39/e, Khanna Publishers, 2006.
- [4] S S Sastry, *Engineering Mathematics, Vol I & II*, 3/e, Prentice Hall, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 1			
Subject Code & Name	Instructions Hours per Week			Credits			
AMR1C1: Applied Mathematics-I	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To develop the concepts of calculus, useful to create mathematical models in order to arrive into an optimal solution in various disciplines like physics, engineering, economics, and statistics.
- Provide the fundamentals of formal techniques like differentiation to find the slope of a curve, find approximation to the original function by Taylor's series, determine the stationary points of functions in order to sketch their graphs, optimization of functions and so on; Integration to find areas, volumes, central points and many useful things; Vector fields to represent many physical quantities like velocities, forces (useful in fluid mechanics), particle displacements (useful in solid mechanics), and electric and magnetic fields (electromagnetism).

Prerequisites: Knowledge of basics of functions, limits, derivatives, and integrals.

COURSE OF CONTENTS

UNIT-I

Differential Calculus: **Review of Successive differentiation, Leibnitz theorem and problems;** Expansion of functions by Taylor's and Maclaurin's Theorem; Asymptotes; Curvature in Cartesian and Polar Coordinates; Envelopes; Evolutes and Involutives.

UNIT-II

Advanced Differential Calculus: Function of Several Variables; Partial Differentiation; **Approximations and errors;** Jacobians; Taylor's Series of Two Variables; Maxima and Minima of Function of Two and More Variables; Lagrange's Method of Undetermined Multipliers.

UNIT-III

Integral Calculus: **Beta and Gamma functions; detailed study of tracing of curves-Cartesian, polar and parametric curves;** Area; Length of Curve; Volume; Surface of Revolution; Theorems of Pappus and Guldin and problems.

UNIT-IV

Advanced Integral Calculus: Multiple integrals: Double and Triple Integration; Change of Order of Integration; Area; Volume; Centre of Gravity; Moment of Inertia.

UNIT-V

Vector Calculus: Differentiation of a Vector; Gradient; Divergence; Curl; Integration of a Vector Function; Gauss's, Green's and Stoke's Theorems.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply the concept of function derivatives to study the behaviour and rate of how different quantities change, how the graph of a function can actually be computed, analysed, and predicted and use integrals to find the summation of infinitely many small

factors to determine whole.

- Learn the applicability of calculus in various fields like, in physics, it is used in the study of motion, electricity, heat, light, harmonics, acoustics, astronomy, dynamics and advanced physics concepts including electromagnetism and Einstein's theory of relativity use calculus. In the field of chemistry, calculus can be used to predict functions such as reaction rates and radioactive decay. In addition, it is used to check answers for different mathematical disciplines such as statistics, analytical geometry, and algebra.
- Find a way to construct relatively simple quantitative models of change, and deduce their consequences.

BOOKS RECOMMENDED

- [1] B.S. Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
- [2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
- [3] Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
- [4] C. Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
- [5] H.K. Das, Higher Engineering Mathematics, S.Chand New Delhi.
- [6] E Mendelson, G J Hademenos, F Ayres, Schaum's Easy Outline: Calculus, McGraw-Hill, 2000.
- [7] R C Wrede, M Spiegel, Schaum's Outline of Advanced Calculus, 2/e, McGraw-Hill, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
1AP002 Applied Physics		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objectives: To introduce the fundamental concepts of physics that are useful in solving problems of engineering especially for semiconductors, optics, electromagnetism and quantum mechanics.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Optics-I: Interference of Light Waves: ~~Methods~~ ~~Division of Wave front~~ and Division of Amplitude, ~~Young's double slit experiment~~, Thin film, Newton's Ring experiment; Diffraction of Light Waves: Fresnel's & Fraunhofer diffraction, Zone plate, Single slit experiment, Diffraction at Circular aperture, Plane transmission Grating.

Unit-II

Optics-II: Polarization of Light Waves, Double refraction, Nicol Prism, Half Wave & Quarter Wave plates, Circularly & elliptically polarized light, Polarimeter; LASER: Stimulated & spontaneous emission, Population Inversion, Optical Resonator, Einstein's coefficients, He-Ne Laser, ~~Ruby Laser~~, Semiconductor Laser; Optical Fiber: types of Fibers, Acceptance angle, Numerical aperture, V-Number, Propagation of Light through Fibers, Applications.

Unit-III

Crystal Structure and Semiconductors: Seven crystal systems, Bravais Lattice, Symmetry & properties of Simple crystal structure, Miller's Indices; Semiconductors: Band theory of Semiconductors, Intrinsic & extrinsic semiconductors, Fermi level, pn junction diode, LED, Zener diode, npn & pnp Transistors.

Unit-IV

Electromagnetism: Continuity equation for Charge & Current, Inconsistency of Ampere's law for time varying field, Concept of Displacement current, Maxwell's equations; Wave equations for E & H, Propagation of one dimensional electromagnetic waves in dielectric medium, Energy density in electromagnetic field, Poynting Vector.

Unit-V

Quantum Physics: Plank's law, Compton's effect, Concept of Matter Waves, Devison & Germer's experiment, Phase velocity & Group velocity, Heisenberg's Uncertainty Principle; Schrodinger's Wave Equation, Interpretation of Wave function Ψ , Time dependent & Time Independent equations, Schrodinger's Wave equation for a free particle in a box.

BOOKS RECOMMENDED:

- [1] R Feynman, *Feynman Lectures on Physics*, 2/e, Narosa Publication, 1998
- [2] D Halliday and R Resnick, *Physics Vol-II*, Wiley Eastern, 1993
- [3] H White, *Modern Physics*: Van Nostrand; 15/e
- [4] D P Khandelwal, *Optics and Atomic Physics*.
- [5] R K Gaur & S L Gupta, *Engineering Physics*, Dhanpat Rai & Sons, 2006
- [6] A S Vasudev, *Modern Engineering Physics*, 4/e, S.Chand & Co, 2007

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE - I Year (Common to all branches) Semester- 2				
Subject Code & Name	Instructions Hours per Week			Credits			
APR2C2: Applied Physics	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To introduce the basics concepts of physics and make a bridge between basics and their application.
- To introduce the concept of the modern science like Laser, Optical fire, X-rays and quantum physics.
- To introduce fundamental physics like wave optics, interference, diffraction polarization, and semiconductor physics.

Pre requisites: Basic knowledge of Optics, Crystal Structure and Semiconductors.

COURSE OF CONTENTS

UNIT-I

Optics-I: Interference of Light Waves: Thin film, Newton's Ring experiment, Michelson interferometer; Diffraction of Light Waves: Fresnel's & Fraunhofer diffraction, Zone plate, Single slit experiment, diffraction by double slit, Diffraction at Circular aperture, Plane transmission Grating.

UNIT-II

Optics-II: Polarization of Light Waves, Double refraction, Nicol Prism, Half Wave & Quarter Wave plates, Circularly & elliptically polarized light, Polarimeter; LASER: Stimulated & spontaneous emission, Population Inversion, Optical Resonator, Einstein's coefficients, He-Ne Laser, CO₂ Laser, Semiconductor Laser; Optical Fiber: types of Fibers (material, refractive index, mode), Acceptance angle, Numerical aperture, V-Number, Propagation of Light through Fibers, Applications.

UNIT-III

Crystal Structure and Semiconductors: Symmetry & properties of Simple crystal structure, Miller's Indices, Interplanar spacing, production and properties of x-ray, Bragg's law; Semiconductors: Band theory of Semiconductors, Intrinsic & extrinsic semiconductors, Fermi level, pn junction diode, LED, Zener diode, npn & pnp Transistors.

UNIT-IV

Electromagnetism: Continuity equation for Charge & Current, Inconsistency of Ampere's law for time varying field, Concept of Displacement current, Maxwell's equations; Wave equations for E & H, Propagation of one dimensional electromagnetic waves in dielectric medium, Energy density in electromagnetic field: Poynting Vector.

UNIT-V

Quantum Physics: Planck's law, Compton's effect, Concept of Matter Waves, Devison & Germer's experiment, Phase velocity & Group velocity, Heisenberg's Uncertainty Principle; Schrodinger 's Wave Equation, Interpretation of Wave function Ψ , Time dependent & Time Independent equations, Schrodinger's Wave equation for a free particle in a box.

Learning Outcomes:

- The student will demonstrate the ability to use concepts of Modern physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their application to obtain quantitative solutions of problems in physics.

BOOKS RECOMMENDED:

- [1] R K Gaur & S L Gupta, Engineering Physics, Dhanpat Rai & Sons, 2006
- [2] H.K. Malik & A.K.Singh, Engineering Physics, Tata McGraw Hill, 2011
- [3] N. Gupta & S.K. Tiwary , A Text Book of Engineering Physics, Dhanpat Rai & Co. 2009.
- [4] W. T. Silfast, Laser Fundamentals Cambr. Un. Press, 1996,
- [5] D Halliday & R Resnick, Physics Vol-II, Wiley Eastern, 1993
- [6] H White, Modern Physics: Van Nostrand; 15/e.
- [7] D P Khandelwal, Optics and Atomic Physics.
- [8] R Feynman, Feynman Lectures on Physics, 3/e, Narosa Publication, 1998.
- [9] S.O. Pillai, Solid State Physics, New Age International Publication, 2010.
- [10] R.S. Sedha, A Text Book of Applied Electronic, S. Chand & company Lmt. 2005.
- [11] R.P. Goyal, Unified Physics-II,,and III Shival Agrawal & Co. ,1994.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to All Branches)					
Subject Code & Name	Instructions Hours per Week			Marks					
IME003: ENGINEERING DRAWING	L	T	P		TH	C W	S W	PR	Total
	2	0	4	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	35	25	25	25	110

COURSE OF CONTENTS

UNIT I

1. **INTRODUCTION:** Need of Engineering Drawing for Engineers, Introduction & Classification of Engineering Drawings, Drawing Instruments and their uses, Indian Standards for Drawing.
2. **GEOMETRICAL CONSTRUCTION:** Basic Geometrical Constructions, Terms used in Geometrical Constructions.
3. **CONVENTIONS:** Lines, Materials, Common Features, Various Machine Parts.
4. **TECHNICAL LETTERING,** Drawing Sheet Layout, Dimensioning
5. **ENGINEERING SCALES:**
 - a. Plain, Diagonal, Comparative, Vernier and Scale of Chords
6. **ENGINEERING CURVES:**
 - a. Loci of Points & Lines, Conic Sections, Cycloid Curves, Involute Curves and Spirals Curves, Normal and Tangent to these curves

UNIT II

1. **ORTHOGRAPHIC PROJECTIONS.**
2. **ISOMETRIC PROJECTION**
3. **INTRODUCTION** to Oblique Projection and Perspective Projections.
4. ~~Practice of Computer Aided Drawings of Orthographic and Isometric Projections using AutoCad~~

UNIT III

1. **PROJECTION OF POINTS and STRAIGHT LINES**
2. **PROJECTION OF PLANES**

UNIT IV

1. **PROJECTION OF SOLIDS and SECTION OF SOLIDS**
2. **DEVELOPMENT OF SURFACES**

UNIT V

1. **INTERPENETRATION OF SOLIDS**
2. **FREEHAND SKETCHING OF MACHINE PARTS** (Simple Nuts and Bolts, Keys, Pins, Screw Threads, Riveted joints, Welded joints and Couplings.)

BOOKS RECOMMENDED:

- [1]. P. S. Gill, *Engineering Drawing*, S. K. Kataria & Sons, New Delhi 2007
- [2]. N. D. Bhatt, *Engineering Drawing*, Charoter Publishing House, New Delhi 2007
- [3]. P. S. Gill, *Machine Drawing*, S. K. Kataria & Sons, New Delhi 2007
- [4]. N. D. Bhatt, *Machine Drawing*, Charoter Publishing House, New Delhi 2007

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I (Common to all branches/ Branch) Semester- A/B,B/A				
Subject Code & Name		Instructions Hours per Week		Credits				
MER2C3:Engineering Drawing		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		2	1	4	2	1	2	5

Learning Objectives:

- To understand the concepts of imagining, envisioning and visualizing the objects & machine parts and drawing them with the instruments & tools.
- To introduce the students to the “universal language of Engineers” for effective communication through drafting exercises of geometrical solids.

Pre requisite(s): Nil

COURSE CONTENTS

Unit-I

Introduction, need & Classification of Engineering Drawings, Drawing Instruments and their uses, Indian Standards for Drawing, Drawing Sheet Layout, Various conventions used in drawing, Technical Lettering, Dimensioning, Basic Geometrical Constructions. **Engineering Scales & Engineering Curves**

Unit - II

Orthographic Projections, Isometric Projections, Oblique Projections, Perspective Projections & Missing Views.

Unit - III

Projection of Points, Straight Lines and Plane Surfaces.

Unit - IV

Projection of Solids, Section of Solids & Development of Surfaces.

Unit - V

Interpenetration of Solids / Intersection of Surfaces, **Introduction to Computer Aided Drawings**, Drawing of Machine elements like Riveted Joints, Screw fasteners and Welded Joints.

Learning Outcomes:

- Upon Completing the Course, Student will able to:
- Understand the importance of BIS and ISO Standards in Engineering Drafting.
- Graphically construct and understand the importance of mathematical curves in engineering applications.
- Visualize geometrical solids in 3D space through exercises in Orthographic Projections.
- Interpret Orthographic, Isometric and Perspective views of objects.
- Develop the surfaces of geometrical solids.

Text Books

1.Bhatt N D, *Engineering Drawing*, Charoter Publishing House, Anand, Gujrat 2.Agrawal B, and Agrawal C M, *Engineering Drawing*, Tata McGraw-Hill Publishing Company Limited.

References Books

1. French T E, Vierck C J, Foster R J, *Engineering. Drawing and Graphic Technology* Mc Graw-Hill International, Singapore, Low Price Edition.
2. Luzadder W J, Duff J M, *Fundamentals of Engineering Drawing*, Prentice- Hall India, New Delhi.
3. Dhananjay A Jolhe, *Engineering drawing*, Tata McGraw Hill.
4. Shah M B and Rana B C , *Engineering Drawing*, Pearson Education, New Delhi.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
1EI004 Electrical Engineering		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objectives: To understand the concepts and practical ideas of AC/DC circuits, Electromagnetic Circuits, Transformers and Electric Machines those are basic to all the engineering streams.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

AC circuits: Generation of EMF, Phasor Quantities, RMS, Average, Form Factor, Peak Factor Etc, Phasor Diagrams; Single Phase AC Circuits: R, L, C And Combinations, Resonance, Q-Factor, Bandwidth; Three Phase AC Circuits: Generation, EMF, Phase Sequence, Analysis of Star and Delta Connections, and Power Measurement In Single Phase& Three Phase Circuit.

Unit-II

Circuit analysis tools: Kirchoff's laws, Analysis of DC and AC circuits, Thevenin's theorem, Norton's theorem, Max power transfer theorem, Superposition theorem, and Source transformation .

Unit-III

Magnetic Circuits: Electromagnetism, Magnetic flux, Magnetic flux density, Intensity of magnetization, B-H curves, hysteresis and eddy current losses, Magnetic circuit calculations, laws of Electro-magnetic induction, Magnetic induction, Lifting power of an electromagnet.

Unit-IV

Transformer: Construction, principle, ideal transformer, EMF equations, Analysis of transformer on no load and load conditions, Equivalent resistance and reactance, voltage regulations, transformer losses Transformer testing, transformer efficiency, Types of transformer, Cooling methods, Auto transformer.

Unit-V

Rotating electric Machines: Construction, working principles, EMF equations, Characteristics, Torque equations of DC machines (generators & motors), 3-phase synchronous and induction motor, single phase induction motor.

BOOKS RECOMMENDED:

- [1] V Del Toro, *Electrical Engineering Fundamentals*, 2/e, PHI, 2000.
- [2] D P Kothari, I J Nagrath, *Basic Electrical Engineering*, 2/e, Tata McGraw Hill, 2002 (Fifth Reprint 2003).
- [3] A Sudhakar, *Network Theory*, 2/e, Tata McGraw Hill, 2004
- [4] P S Bimbhara, *Electrical Machinery*, 7/e, Khanna Publishers, New Delhi, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE - I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR2C4: Electrical Engineering	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To understand the concepts and practical ideas of AC/DC circuits along with basic 3 phase power management, Properties of different magnetic material used in Electromagnetic Circuits to create an idea among students that how different magnetic materials were choose for different practical machines.
- Practical concepts of Transformers and different Electric Machines to make students easy understanding of electrical machines surrounded by us and also they are basic to all the engineering streams.

Prerequisite(s): Basic circuital laws and their practical applications.

COURSE OF CONTENTS

UNIT-I

AC circuits: Generation of EMF, Phasor Quantities, RMS, Average, Form Factor, Peak Factor Etc, Phasor Diagrams; Single Phase AC Circuits: R, L, C And Combinations, Resonance, Q-Factor, Bandwidth; Three Phase AC Circuits: Generation, EMF, Phase Sequence, Analysis of Star and Delta Connections, and Power Measurement In Single Phase& Three Phase Circuit.

UNIT-II

Circuit analysis tools: Kirchoff's laws, Analysis of DC and AC circuits, Thevenin's theorem, Norton's theorem, Max power transfer theorem, Superposition theorem, and Source transformation .

UNIT-III

Magnetic Circuits: Electromagnetism, Magnetic flux, Magnetic flux density, Intensity of magnetization, B-H curves, hysteresis and eddy current losses, Magnetic circuit calculations, laws of Electro-magnetic induction, Magnetic induction, Lifting power of an electromagnet.

UNIT-IV

Transformer: Construction, principle, ideal transformer, EMF equations, Analysis of transformer on no load and load conditions, Equivalent resistance and reactance, voltage regulations, transformer losses Transformer testing, transformer efficiency, Types of transformer, Cooling methods, Auto transformer.

UNIT-V

Rotating electric Machines: Construction, working principles, EMF equations, Characteristics, Torque equations of DC machines (generators & motors), 3-phase synchronous and induction motor, single phase induction motor.

Learning Outcomes:

Upon completing the course, students will be able :

- To solve circuit problems based on KVL, KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .
- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing a electrical machine at initial level.
- After this course, students were able to understand different properties, characteristics and functioning of different parts of transformer and different rotating electrical machines at basic level.

BOOKS RECOMMENDED:

- [1] V Del Toro, Electrical Engineering Fundamentals, 2/e, PHI, 2000.
- [2] D P Kothari, I J Nagrath, Basic Electrical Engineering, 2/e, Tata McGraw Hill, 2002 (Fifth Reprint 2003).
- [3] A Sudhakar, Network Theory, 2/e, Tata McGraw Hill, 2004
- [4] P S Bimbhara, Electrical Machinery, 7/e, Khanna Publishers, New Delhi, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester					
Subject Code & Name		Instructions Hours per Week			Marks				
1CO005 Computer Programming		L	T	P	TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	250
					Min	35	25	25	110

Course Objectives: To understand the concepts of problem solving on computers and to learn the programming concepts & practices that are useful in engineering domain.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Introduction: ~~Block Diagram of Computer~~; Problem-Solving Basics; ~~Algorithms~~; Flowcharts; Classification of Programming Languages.

Unit-II

C++ Programming: Data Representation- Fundamental Types, Variables & Constants; Expressions- Numeric, Assignments; Input/Output; Control Structures- Repetition Statements, Selective Statements; Programming with Libraries.

Unit-III

Arrays Functions And Pointers: Single and Multidimensional Array- Declaration and Usage, Function- Declaration & Usage; Parameter Passing and Scope Rules; Pointer Declaration and Usage; File Handling in C++.

Unit-IV

Classes And Objects: Declaration, Constructor and Destructor; Access Functions; Structures,; Pointers to Objects; ~~String Handling using Classes.~~

Unit-V

Advance C++ Features: Operator Overloading; Inheritance; Polymorphism.

BOOKS RECOMMENDED:

- [1] H Schildt, *The Complete Reference*, 4/e, Tata McGraw Hill, 2006.
- [2] BJarne Stroustrup, *The C++ Programming Language*, 3/e Addison Wesley, 2000.
- [3] Ravichandran, *Programming with C++*, 2/e, Tata McGraw Hill, 2007
- [4] G Droomey G, *How to Solve it by Computer*, 1/e, Prentice Hall, 2001.
- [5] D Gries, *Programming Methodology*, Springer Verlag, 1978.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions Hours per Week			Credits			
COR2C5: Computer Programming in C++	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives: -

1. To learn to analyse a problem and construct a C++ program that solves it using C++ basic constructs and advanced constructs.
2. To learn the syntax and semantics of the C++ programming language.
3. To learn how to design C++ classes with constructors and class member functions.
4. To understand the concept of data abstraction and encapsulation.
5. To learn how to overload and override functions and operators in C++.
6. To learn how containment and inheritance promote code reuse in C++.
7. To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
8. To learn how to use exception handling in C++ programs.

Prerequisites: Basic knowledge of computer parts, algorithms, flowcharts, operators.

COURSE OF CONTENTS

UNIT-I

Introduction to flowcharts and problem solving. Types of programming languages, Programming with C++:- C++ Data Types:-auto, bool, int, char, float, double, void. Variables and Constants, Operators, Arithmetic and Logical Expressions, Assignment Statements and Type Casting. Control structures- Iteration statements, Jump Statements and Selective statements. **Common C++ Header files, Generation of Random numbers in C++.**

UNIT-II

Functions: Introduction - Call by Value and Call by Reference – return values – **recursion – Arrays - Introduction to Arrays - Initialization of Array - Multi dimensional Arrays - passing arrays to functions – Strings - Arrays of Strings - Standard Library String Functions.**

Structures: Structure elements, Nested Structures, Array of Structures, Array within structures and passing structures to functions.

Unit- III

Pointers:-Declaration and Initialization of Pointers, **Dynamic Memory allocation/deallocation operators:-new and delete.** Pointers and Arrays:-Array of Pointers, Pointer to an array, **Function returning a pointer, Reference variables and use of alias. Invoking functions by passing pointers.** Files – Introduction – File Structure - File handling functions - File Types - Error Handling.

UNIT-IV

Object Oriented Programming Paradigm - Basic Concepts of OOP - Benefits of OOP. Class and object fundamentals and various visibility modes in class, Object as function arguments- pass by value and pass by reference. Constructor:-Special Characteristics, Declaration and

Definition of a Constructor, Default Constructor, Overloaded Constructor, Copy Constructor and Constructor with default arguments.

Function Overloading:-Need and restrictions of overloaded functions, Steps involved in finding the best match, Default arguments versus overloading.

Destructor:- Special Characteristics, Declaration and Definition of a Destructor. Friend function and its characteristics and friend class.

UNIT-V

Introduction to Operator overloading - Rules for Operator overloading – overloading of binary and unary operators - Introduction to inheritance – Types of inheritance - Abstract Classes - new Operator and delete Operator - Pointers to Objects – this Pointer - Virtual Functions - Pure Virtual Functions - Introduction to Class Templates - Function Templates - Member Function Templates - Basics of Exception Handling - Types of exceptions - Exception Handling Mechanism - Throwing and Catching Mechanism - Rethrowing an Exception - Specifying Exceptions.

Learning Outcomes:-

Upon completing the course, students will be able to:-

1. To develop C++ programs using basic and advanced constructs that will solve real life problems.
2. The course aims to understand the features of C++ supporting object-oriented programming.
3. Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
4. Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

BOOKS RECOMMENDED:

- [1] Coohoon and Davidson, C++ Program Design: An introduction to Programming and Object-Oriented Design (3rd edition), Tata McGraw Hill, New Delhi, 2003.
- [2] Herbert Schildt, the Complete Reference, Tata McGraw Hill.
- [3] E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education.
- [4] Ravichandran, Programming With C++, Tata McGraw Hill.
- [5] Dromey G, How to solve it by Computer, Prentice Hall – 1978.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester					
Subject Code & Name		Instructions Hours per Week			Marks				
1SS006 Humanities		L	T	P	TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		2	-	-	Max	-	50	-	50
					Min	-	25	-	25

Course Objectives: To learn the human values and ethical values that are essential for an engineer to practise in the day to day life during the field work while working with the society.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Role of Humanities in Engineering: Engineering Ethics: Basics of Ethics; Professional Engineer; Professional Engineering Bodies; Code of Ethics.

Unit-II

Engineers and Society: Society and Its Features; Social Institutions; Social Stratification and Change; Cross-cultural Issues;

Unit-III

~~Engineering & Environment: Environment Basics; Natural Resources; Ecology and Horticulture.~~

Unit-IV

Government & Engineers: Political parties; Types & Forms of Government; Government Artifacts; NGOs.

Unit-V

~~e-Society & Knowledge Society; Digital Government (e-Governance); Digital Divide.~~

BOOKS RECOMMENDED:

- [1] D J Kemper, *Introduction to Engineering Profession*, 2/e, Suanders Publication, 1998.
- [2] A S Chauhan , *A Text Book of Social Science* Jain Brothers 9/e,2008
- [3] R C Agrawal, *Principle of Political Science*,

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE-I Year (Common to all branches) Semester- 2				
Subject Code & Name	Instructions Hours per Week			Credits			
SSR2S2: Humanities	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	2	-	-	2	-	-	2

Learning Objectives:

- To introduce students to understand and interpret the human experience from individual to entire culture.
- It also helps to understand how human beings across time and cultures understand happiness & suffering, understand good from bad, debate political questions.
- To understand that their actions have a Social, economic and environmental impact. To inspire ethical & moral course of thinking.

Prerequisite(s): Nil.

COURSE OF CONTENTS

UNIT-I

Man and society- Theories of man and society, Methodological individualism, structuralism, Society and its features- Social Institutions; Social Stratification and Change; Contemporary Indian Philosophy-its characteristics and Cross-cultural Issues.

UNIT-II

Human Behavior: Biological Bases of Behavior, Psychobiology of learning, memory, emotions and personality, Temperament and personality: trait structure and persistence, Extraversion/sociability, Aggression-hostility/agreeableness, Philosophy of Mind & Cognition. Concepts of good life – quality of life and subjective well-being; happiness, life satisfaction, and positive affect.

UNIT-III

Perspectives on Knowledge, Science and Technology, Technological Shaping of Society and Social Shaping of Technology and its Human roots, Role of Humanities in Engineering; Professionalism in Engineering; Professional Engineering Bodies.

UNIT-IV

Governance and Engineers: Political parties; Types & Forms of Governance; Utilitarianism; capitalism, socialism and communism; Marxist and neo-Marxist thoughts; democracy in public and private spheres.

UNIT-V

Engineering and Corporate Social responsibility- Ecology and Natural Resources, Role of corporations in the society, Morals, Values, Consciousness, Experience: Basic codes of Ethics; Engineering Ethics, Evolution of CSR, Strategic CSR, Role of stakeholders in CSR, Consumer awareness towards CSR, CSR as competitive advantage, the Global Competitiveness Index (GCI) & Sustainability, Issues in CSR- organizational, economic & social.

Learning Outcomes:

On successful completion of course we will have

- Aspire students to be world citizens of broad perspective who can make educated and ethical

decisions.

- Students who articulate their own values & beliefs and can apply them in their personal & professional life.
- To become a model human being.

BOOKS RECOMMENDED:

[1] D J Kemper, Introduction to Engineering Profession, 2/e, Suanders Publication, 1998.

[2] A S Chauhan, A Text Book of Social Science Jain Brothers 9/e, 2008.

[3] R C Agrawal, Principle of Political Science.

[4] NPTEL

[5] W.B. Werther& D. Chandler, Strategic Corporate Social Responsibility, Thousand Oaks, 2011.

[6] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.

GROUP-B

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
1AM051 Applied Mathematics-II		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	-	Max	100	50	-	-	150
					Min	35	25	-	-	60

Course Objectives: To introduce the mathematical concepts of Matrix Algebra, Probability, and Differential Equation for solving engineering problems that shall be used in various branches of engineering.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Matrix Algebra: Review of Matrices; Elementary Operations on Rows and Columns; ~~Matrix Inversion by Partitioning and Crout's Method~~; Normal Form; Linear Dependence.

Applications: Rank; Application of Rank Theory in Solving System of Linear Equations; Linear Transformation; Orthogonal, Unitary and Hermitian Matrices; Characteristic Equation; Eigen- Values and Eigen-Vectors; Caley-Hamilton Theorem; Quadratic and Linear forms.

Unit-II

Probability: ~~Review of Probability; Additive and Multiplicative Laws~~; Conditional Probability, Baye's Theorem.

Statistics: Binomial, Poisson and Normal Probability Distributions, Method of Least Squares and Curve Fitting.

Unit-III

First Order Ordinary Differential Equation: ~~Differential Equations of First Order and First Degree~~; Exact Differential Equation; Equations Solvable for X and Y; Clairaut's Form.

Higher Order Ordinary Differential Equation: Linear Differential Equations with Constant & Variable Coefficients; Simultaneous Differential Equations; Application to Simple Problems.

Unit-IV

First Order Partial Differential Equations: Formation of Partial Differential Equations; Partial Differential Equations of First Order and First Degree i.e. $Pp + Qq = R$.

Higher Order Partial Differential Equations: Linear Homogenous Partial Differential Equations of n^{th} Order with Constant Coefficients; Method of Separation of Variables & Their Simple Applications.

Unit-V

~~Fourier series: Periodic functions, Dirichlet conditions, Expansion of function in Fourier series. Half Range Fourier series: Half range sine and cosine series, Change of interval.~~

BOOKS RECOMMENDED:

- [1] G Paria, *Matrix and Tensors*, 2/e, Scholar Publication, 2004.
- [2] *Matrix Operations*, Schaum's Outlines
- [3] *Probability & Statistics*, 2/e, Schaum's Outlines, 2004
- [4] *Differential Equations*, Schaum's Outlines, 2/e, TMH, 2005.
- [5] *Partial Differential Equations*, Schaum's Outlines
- [6] *Fourier Analyssi*, Schaum's outlines, 1/e, TMH, 2005
- [7] G Paria, *Ordinary Differential Equations with Laplace Transform*, 3/e, Scholar Publications, 1998
- [8] G Paria, *Partial Differential Equations and Complex Variable*, 2/e, Scholar Publications, 1998

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester- 2			
Subject Code & Name	Instructions Hours per Week			Credits			
AMR2C1: Applied Mathematics-II	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	-	3	1	-	4

Learning Objectives:

- To introduce the mathematical concepts of Matrix Algebra, Differential Equation Probability and Statistics and Fuzzy sets for solving engineering problems that shall be used in various branches of engineering.
- Provide the basics of Matrix mathematics useful in providing a more compact way to deal with groups of equations in linear algebra; Differential equations, a mathematical equation that relates some function (usually represent physical quantities) with its derivatives (represent their rates of change), and the equation defines a relationship between the two; Probability distributions describe the dispersion of the values of a random variable; Curve fitting and regression analysis, to find the "best fit" line or curve for a series of data points; Theory of equations, which tells when an algebraic equation has an algebraic solution; Fuzzy sets generalize classical sets (Crisp sets), as the characteristic functions of classical sets are special cases of the membership functions of fuzzy sets.

Prerequisites: Knowledge of basics of determinants, matrices, derivatives, integrals, sets, probability and statistics.

COURSE OF CONTENTS

UNIT-I

Matrix Algebra: Review of Matrices; Elementary Operations on Rows and Columns; Normal Form; Linear Dependence; Rank; Application of Rank Theory in Solving System of Linear Equations; Linear Transformation; Orthogonal, Unitary and Hermitian Matrices; Characteristic Equation; Eigen- Values and Eigen-Vectors; Caley-Hamilton Theorem; Quadratic and Linear forms.

UNIT-II

First Order Ordinary Differential Equation: Exact Differential Equation; Equations Solvable for x, y and p; Clairaut's Form; **Application to Simple Problems.**
Higher Order Ordinary Differential Equation: Linear Differential Equations with Constant & Variable Coefficients; **Method of Variation of Parameters**, Simultaneous Differential Equations; Application to Simple Problems.

UNIT-III

First Order Partial Differential Equations: Formation of Partial Differential Equations; Partial Differential Equations of First Order and First Degree i.e. $Pp + Qq = R$.
Higher Order Partial Differential Equations: Linear Homogenous Partial Differential equations of n^{th} order with constant coefficients; method of Separation of variables; their Simple applications.

UNIT-IV

Probability and Statistics: Conditional Probability, Baye's Theorem; Binomial, Poisson and Normal distributions and their Mean and Variance, Methods of least squares and curve fitting,

Correlation and Regression Analysis.

UNIT-V

Theory of Equations: Polynomial equations, relation between root and coefficients, symmetric functions of roots, cube roots of unity, Cardon's method for solution of cubic equations.

Fuzzy sets: Membership function, definition, Operations on Fuzzy sets, Properties of Fuzzy sets.

Learning Outcomes:

Upon completing the course, students will be able to:

- Express a linear map between finite-dimensional vector spaces with a matrix, calculate the electrical properties of a circuit, with voltage, amperage, resistance, etc. with matrix arithmetic, use them in 3D geometry (e.g. computer graphics), can try to improve linear solvers efficiency. Matrices can also represent quadratic forms (for example, in analysis to study hessian matrices, which help us to study the behaviour of critical points) and also computers run Markov simulations based on stochastic matrices in order to model events ranging from gambling through weather forecasting to quantum mechanics.
- Use differential equations to model natural phenomena, engineering systems and many other situations like exponential growth and decay, the population growth of species or the change in investment return over time, describing the movement of electricity, in modelling chemical reactions, in finding optimum investment strategies, describing the motion of waves, pendulums or chaotic systems.
- Handle probability distributions, to indicate the likelihood of an event or outcome, which are used for making forecasts and risk assessments. Pdf's are quite important and widely used in insurance, engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.
- Use fitted curves as an aid for data visualization, to infer values of a function where no data are available, and to summarize the relationships among two or more variables.
- Apply Fuzzy sets and logic to reason like a human in terms of linguistic variables, design Traffic monitoring systems, AC and heating ventilation, Gene Expression data analysis, Facial pattern recognition, Weather forecasting systems and many more.

BOOKS RECOMMENDED:

- [1] B.S. Grewal, Engineering Mathematics, 39/e, Khanna Publishers, 2006.
- [2] Erwin. Kreyszig, Advanced Engineering Mathematics, 8th edition, John Willy and sons Publications, 1999.
- [3] Ramana B V, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
- [4] C. Ray Wylie & Louis C. Barretle, Advanced Engineering Mathematics, Tata McGraw Hill Publishing Co. Ltd., 6/e, 2003.
- [5] H.K. Das, Higher Engineering Mathematics, S. Chand New Delhi.
- [6] Zafar Ahsan, Differential Equation and their Applications, Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
- [7] S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons., 2000.
- [8] Freund John E, Mathematical Statistics, PHI, N.D., 7th Ed., 2010.
- [9] G. J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, PHI, New Delhi, 2005.
- [10] H. J. Zimmerman, Fuzzy Set Theory and its Applications, Allied Publishers, 1996.
- [11] Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3rd Edition, John Wiley & Sons, Inc., 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
1AC052 Chemistry & Environmental Science		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objectives: To understand and learn the concepts of engineering chemistry along with the need and requirements of environment and to become aware of the changing environment.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Water: Sources; Impurities; Hardness- Its Expression & Determination; Boiler Troubles & Their Causes; Industrial Water Requirement; Treatment of Water for Industrial Purpose; De-Ionization of Water; ~~Alkalinity in Water~~; Numerical Problems on Water Analysis & ~~Water Softening Processes~~.

Unit-II

Engineering Materials: Introduction, Classification & Requirement of Engineering Materials.

Polymers: Chemistry of Polymer Materials & Their Diversification; Types of Polymerization & their Brief Account; Examples of Polymers; Cement, Glass And Refractory: Different Types; Composition; Properties & Uses.

Unit-III

Lubricants: Introduction; Types of Lubricants & Principle of Lubrication, Properties & Tests of Lubricants; Greases; Graphite; ~~Cooling Liquids & Cutting Fluid~~.

Unit-IV

Instrumental Techniques In Chemical Analysis: Introduction; Infrared; Ultraviolet; Nuclear Magnetic Resonance Spectro-photometry; Calorimetry; Lamberts & Beer's Law, Chromatography.

Unit-V

Environmental Science: Components of Environment & Their Interactions; Natural Resources; Ecosystem; Impacts of Development of Environment; Environment Protection Act; ~~Concept of ISO-14000~~; Pollution & Its Types; Description of Air, Water; Land & Noise Pollution; Chemical Toxicology & Its Effects; Control Measures; Global Warming; Depletion of Ozone Layer; Acid Rains, Eutrophication; Pollution Case Studies.

BOOKS RECOMMENDED:

- [1] P C Jain & Monica Jain, *Engineering Chemistry*, 16/e, Dhanpat Rai Publications, 2007.
- [2] J C Kuriacose & J Rajaram, *Engineering Chemistry*, Tata McGraw-HillCo, New Delhi, 2004.
- [3] B Joseph, *Environmental Studies: Core Engineering Series*, Tata McGraw Hill,
- [4] A K De, *Environmental Chemistry*, 2/e, New Age International, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE -I Year (Common to all branches) Semester- 1 or 2				
Subject Code & Name		Instructions Hours per Week			Credits			
ACR1C2: Applied Chemistry & Environmental Science		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Learning Objectives:

- To learn chemistry of various engineering materials and processes, their importance, properties, testing, structure-property relationship, tailoring and their applications in various technologies.
- To understand and aware with various environmental issues and pollution and control studies in modern society for sustainable development.

Prerequisite: Nil

COURSE OF CONTENTS

UNIT-I WATER AND ITS APPLICATIONS

Sources, impurities, applications, Hardness- its expression and determination; Boiler troubles and their causes; Industrial water requirement, Treatment of water for industrial purpose; De-ionization of water; Analysis of water; Water quality parameters, Numerical problems on water analysis and water treatment processes.

UNIT-II ENGINEERING MATERIALS AND TESTING

Introduction, classification and requirement of engineering materials. Material testings.

Polymers: Chemistry of polymer materials and their diversification; Types of polymerization and their brief account; Examples of polymers.

Cement, Glass and Refractories: Different types, composition, properties and uses.

UNIT-III LUBRICANTS

Introduction, Principle and functions of lubrication, Types of lubricants, Properties, tests and applications of solid, semi-solid and liquid lubricants; Synthetic lubricants and lubricating emulsions.

UNIT-IV INSTRUMENTAL TECHNIQUES IN MATERIAL CHARACTERIZATION

Classification, Lamberts and Beers Law; Introduction, Principle and applications of Colorimetry, IR, UV-Vis, NMR and Mass spectroscopy; Chromatographic Techniques and applications, Numerical Problems on spectroscopic techniques.

UNIT-V ENVIRONMENTAL SCIENCE

Components of Environment and their interactions, Natural resources, Ecosystem, Impacts of development of environment, Environment protection act, EIA, Sustainable development.

Pollution and its types, Description, effects and control measures of Air, Water, Land and Noise pollution, Chemical toxicology, Global warming, Depletion of ozone layer, Acid rains, Eutrophication, Rain water harvesting, Pollution case studies.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply applications of various engineering materials in different technologies.
- Relate structure-property-uses relationship of engineering materials and tailoring of materials for technology development.
- Use of material testing and material characterization required in different engineering applications.
- Understand the components of Environment and their interactions with modern world. Also to analyse factors affecting, causes of Environmental Pollution and to apply possible control measures for Sustainable development.

BOOKS RECOMMENDED:

- [1] Jain & Jain, Engineering Chemistry, Dhanpat Rai Publications, 2007.
- [2] S. S. Dara, A Text Book of Engineering Chemistry, S. Chand & Company, 2007.
- [3] B. Joseph, Environmental Studies, Tata McGraw Hill.
- [4] A.K. De, Environmental Chemistry, New Age International, 1996.
- [5] Shashi Chawala, A Text Book of Engineering Chemistry, Dhanpat Rai Publications, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester					
Subject Code & Name		Instructions Hours per Week			Marks				
1ME053: Elements of Mechanical Engineering		L	T	P	TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	250
					Min	35	25	25	110

Course Objectives: To understand and learn the basic aspects of mechanical engineering in terms of thermal engineering (steam and hot air) and production engineering (metal casting, welding and machine elements) that are essentials in all engineering streams.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Fundamentals of Thermodynamics: Properties and processes, Heat and work, Zeroth law of thermodynamics; Enthalpy and internal energy of gases, First law applied to flow processes, Simple analysis of first law applied to a closed and open systems.

Unit-II

Properties of Steam: Properties, Wet, Dry and Super heated steam; Enthalpy and Internal energy of steam, Critical point and Triple point, Property table, Measurement of Dryness fraction of steam.

Unit-III

Gas Power Cycle: Air standard cycles: Otto cycle, Diesel cycle and Dual cycle; Calculation of efficiency and state points for the cycles; Deviation from theoretical cycles; Effects of variable specific heat and dissociation.

Unit-IV

Metal Casting: Introduction, Advantages, Limitation and applications of metal casting, Pattern making, moulding materials and moulding processes, Cores, Elements of gating, Systems, Melting and pouring of metals, Solidification and cooling of castings; casting processes-: Sand casting, Expandable mould casting and Permanent mould casting, Casting cleaning and finishing, Casting defects.

Unit-V

Welding and Machining: Fundamentals of welding weld ability, Types of welded joints, Classification and overview of welding process, Arc welding processes, Oxy Acetylene gas welding processes, Resistance and solid state welding processes, Weld quality and safety, Barging & soldering; Fundamental of metal machining, introduction of turning and related operations, ~~Drilling and hole machining, Milling and shaping, Construction features of lathe, Radial drilling machine & shaper~~, Cutting tools type and materials.

BOOKS REOMMENDED:

- [1] P K Nag, *Engineering Thermodynamics*, 3/e, Tata McGraw-Hill, 2005.
- [2] R K Rajput, *Thermal Engineering*, 2/e, S.K.Kataria & Sons, 2006.
- [3] Hajra & Chaudhary, *Work Shop Technology*, Vol. 1 & 2, 13/e, Media Promoters & Pub, 2004.
- [4] P N Rao, *Manufacturing Technology*, Tata McGraw Hill, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 1				
Subject Code & Name		Instructions Hours per Week			Credits			
MER1C3: Elements of Mechanical Engineering		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: To understand the basic fundamentals of Mechanical Engineering in light of thermal engineering and production engineering and to provide an insight about the basic thermal and production processes, materials, components and applications.

Prerequisites: Nil.

COURSE OF CONTENTS

UNIT I

Thermodynamics and energy, Temperature and Zeroth law of thermodynamics, Systems and control volume, Properties of a system, Energy transfer by heat and work, First law of thermodynamics, Energy analysis of closed systems, Internal energy and enthalpy of ideal gases, Energy analysis of steady flow systems, Analysis of some steady flow engineering devices, Relevant review problems.

UNIT II

Properties of pure substance, p-v and T-s diagram for a pure substance, Mollier diagram for a pure substance, Quality or dryness fraction, Steam tables, Methods for measurement of steam quality, Relevant review problems.

UNIT III

Basic considerations in the analysis of power cycles, Air standard assumptions, Overview of reciprocating engines, Thermodynamic analysis of Otto cycle: Ideal cycle for spark ignition engines, Thermodynamic analysis of Diesel cycle: Ideal cycle for compression ignition engines, Comparison of Otto and Diesel cycles, Effect of Specific Heat and Dissociation on the performance of the cycles, Relevant review problems.

UNIT IV

Metal Casting: Classification and overview of metal casting processes: sand casting, expandable mould casting and permanent mould casting; Patterns, cores and moulding; Elements of gating systems; Heating, pouring and solidification; Casting quality: cleaning, finishing and defects.

UNIT V

Welding and Machining: Fundamentals of welding and overview of welding processes: Oxy- Acetylene gas welding, Arc welding: TIG, MIG, SAW etc., Resistance welding; Soldering & Brazing; weld quality and defects; Fundamentals of metal machining and introduction to turning and related operations; Constructional features of lathe, Geometry of single point cutting tool and cutting tool materials.

BOOKS RECOMMENDED:

1. Nag P K, Engineering Thermodynamics, The McGraw-Hill Companies, Fourth Edition.
2. P N Rao, Manufacturing Technology, Vol. I and Vol.2 Tata McGraw-Hill, 4th Edition, 2014.
3. Hajra & Chaudhary, Work Shop Technology, Vol. 1 & 2, 12th Edition, Media Promoters & Pub, 2007.
4. Cengel Y A, Boles M A, Thermodynamics-An Engineering Approach, The McGraw-Hill Companies, Fifth Edition.
5. Mikell P. Groover, Fundamentals of Modern manufacturing, 3rd Edition, John Wiley and Sons.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester					
Subject Code & Name		Instructions Hours per Week			Marks				
1ET054 Basic Electronics		L	T	P	TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	2	Max	100	50	50	250
					Min	35	25	25	110

Course Objectives: To introduce the basic concepts of electronics along with the understanding of working fundamental circuit devices such as diode, transistors and logic gates.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

~~Structure & properties of conductors, semiconductors & insulators. Transport phenomenon in semiconductors, Mechanism of current flow in semiconductors, Hall Effect, Mobility, Conductivity equation, Junction- Diode Characteristics, Current Components V-I Characteristics, load line Concept, piecewise linear diode model~~

Unit-II

Characteristics, applications like Clippers, Clampers, Comparators, Voltage Doublers, Samplers, Rectifiers, Peak Detectors, Various types of diodes, their application & V-I Characteristics:- Zener, Avalanche, Photodiode, Tunnel, LED, PIN, Schottky, Seven Segment display, Varacter diode.

Unit-III

The Junction transistors, BJT current Components, Transistor as an amplifier Transistor Construction, Potential Profile in NPN & PNP Structures, ~~Eber's Moll Model~~, CB,CE & CC Configuration, Static & Dynamic Characteristics, Transistor ratings, Photo transistor, Transistor Biasing & thermal Stabilization, Transistor as a Switch.

Unit-IV

~~Introduction to JFET, JFET operation and volt ampere characteristics, transfer characteristics, introduction to MOSFET (depletion type and enhancement type), operation and characteristics of MOSFETS, FET biasing, FET small signal model, JFET CD and CG configuration~~

Unit-V

~~Binary number, Digital systems, Boolean algebra, logic gates, logic functions, realization of logic gates by electronic devices, Positive and negative logic, representation of binary numbers, half adder, full adder, flip flop synchronous and asynchronous circuit, counters registers, memories.~~

BOOKS RECOMMENDED:

- [1] Milliman & Halkies,, *Integrated Electronics*, TMH, 2007.
- [2] R Boylested, *Electronics Devices & Circuits*, 9/e, Prentice Hall, 2006.
- [3] A Motorshed, *Electronics Devices & Circuit*, Prentice Hall, 2006
- [4] Malvino, *Electronics Principles*, , 7/e, TMH, 2007.
- [5] P Malvino, *Digital Electronics*, TMH pub.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE-I Yr (Common to all branches) Semester- 1				
Subject Code & Name	Instructions Hours per Week			Credits			
ETR1C4: Basic Electronics	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To introduce the basic concepts of electronics along with the understanding of working fundamental circuit devices such as diode, transistors and op-amp. To apply the basics of diode to describe the working of rectifier circuits such as Full and half wave rectifiers and zener diode as a voltage regulator in line and load regulation.
- Describe the application of transistors for Current and voltage amplification, the characteristics of different configurations of the transistor, DC load line and bias point. List, explain, and design and analyze the different biasing circuits, to give basic knowledge of working of op-amp, its characteristics and applications.

Prerequisite(s): nil

COURSE OF CONTENTS

UNIT I

Discrete electronic devices: Diode, zener diode, BJT (Bipolar junction transistor), LED, photodiode phototransistor, varactor; characteristic and operation (qualitative description and quantitative behaviour with black box approach)

UNIT II

Diode circuits; clipper, clamper circuits, DC power supply: rectifier-half wave, full wave (center tapped, bridge), zener regulated power supply, regulation (with regulator IC-LM317)

UNIT III

BJT characteristics; BJT biasing; CE-biasing circuits: operating point; h-parameter model of transistor; large/small signal models (concept); large/small signal models of CE-BJT amplifier, Design of amplifier; Differential amplifier (using BJT).

UNIT IV

Operational amplifier: basic model; virtual ground concept; inverting amplifier; non-inverting amplifier; integrator; differentiator; Schmitt trigger; astable multivibrator, Simple active filters: low pass, high pass, bandpass, notch filter

UNIT V

Basic feedback theory; +ve and -ve feedback; concept of stability; oscillator, Waveform generator using op-amp schmitt trigger for Square wave, triangular wave Wien bridge oscillator for sinusoidal waveform

Learning outcomes:

- Students will be able to get the knowledge of Q point and can calculate it using different biasing circuits. They will easily compare different biasing circuits on the basis of stability factor.
- Students will be able to solve clipper and clamper circuits. They get the knowledge of op-amp and its various applications as integrator, differentiator and as an oscillator.

BOOKS RECOMMENDED:

- [1] Ralph J. Smith, R.C. Dorf circuits, devices and systems, John Wiley, 1992.
- [2] R.L. Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002.
- [3] A. S. Sedra, K.C. Smith, Microelectronic circuits, Oxford University Press, 1998
- [4] R.A. Gayakwad, OP-amps and linear integrated circuits, Prentice Hall of India.
- [5] Millman, Grabel, Microelectronics, Mc-Graw-Hill.
- [6] De Carlo, and Lin, Linear circuit analysis, Oxford University Press, 2001 (second edition).
- [7] Hayt, Kammerly and Durbin, Engineering Circuit Analysis, Tata McGraw Hill, sixth edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
1SS055 Technical English		L	T	P		TH	CW	SW	PR	Total
Duration of Theory Paper: 3 Hours		4	-	-	Max	100	50	-	-	150
					Min	35	25	-	-	60

Course Objectives: To develop the English communication skills in terms of reading, writing and understanding of engineering terms with the improved technical English and to be able to express the technical ideas.

Prerequisite(s): nil

COURSE OF CONTENTS

Unit-I

Basic of Technical Communication: Concept and Process of Communication; Forms of Communication: Verbal and Non-Verbal; Technology-Enabled Communication; Barriers to Communication; Essentials of Effective Communication; ~~Nature and Dimensions of Technical Communication~~; Identifying & Defining Audiences for Technical Communication; Types of Communication ranked by importance to Engineering Practice; ~~Language tasks performed by Technical Professionals~~.

Unit-II

Professional Correspondence: Qualities of Professionals Correspondence: Goodwill Techniques; Types of Correspondence: Letters, Memos, Transmittal Correspondence, E-Mail.

Letters: Elements of a Letter: Essential and Optional; Basic Letter Formats; Planning, Organizing, and Writing Business Letters; Types of Business Letters: Positive Letters/~~Good News and Goodwill Messages~~, Negative Letters/Bad-News Messages, Direct Requests, Letters of Inquiry, Sales Letters, Complaint Letters, ~~Letters of Transmittal~~.

Memos: ~~Components of a Memo; Organization, Development, Language and Tone of a Memo~~; Memo Formats; ~~Types of Memos: Status Memos, Negative Memos, Personal Memos, Memos of Transmittal~~.

Employment Communication: Writing Job Application Letters; Designing Resumes; ~~Organization Approaches to Letters of Application and Resumes; Follow Up Correspondence~~.

Unit-III

Technical Writing: ~~Purpose and Characteristics of Technical Writing~~; Technical Writing Process; ~~Technical Writing Style; Formatting Technical Documents for Function and Effectiveness~~; Some Forms of Technical Writing: Technical Descriptions, Summaries, Instructions, Technical Proposals, User Manuals.

~~Communicating Through Reports~~: Essentials of Good Report Writing; Classification of Reports; Planning, Organizing, and Writing the Report: Report Formats: Formal and Informal (Short and Long);

Technical Reports: Structures of a Technical Report; Techniques that help the Process of Writing Technical Reports; ~~Editing and Revising Technical Reports for Style and Usage, for Grammar and Punctuation~~; Some Common Informal Technical Reports: Progress Reports, Lab Reports, Feasibility Reports, ~~Incident Reports~~, Problem-Solving Reports, ~~Reports Identifying Cause and Effect Relationship~~.

Unit-IV

Reading Comprehension: Reading Styles for Technical Professionals; Skimming a Passage to abstract relevant ideas and information; Skimming Memos. Letters and Reports, Rewriting a 'Receptive Passage' as a 'Skim Passage'; Scanning a Passage for specific information; INFERENTIAL COMPREHENSION: Understanding Logical Relationships (Cause-Effect, Rule-Illustration, Data-Conclusion.); Inferring meanings of words, Phrases; and sentences in context; Judging the Tone of the Passage and Identifying the Attitude of the Writer; Précis Writing/Reformulating/Summarizing: Restating in a shortened form the main ideas of a given Passage; Summarizing a Passage for various purposes and for particular audiences; Reducing or Selectively Rewriting a Passage for a specific purpose.

Unit-V

English for Technical Communication: Vocabulary Extension: Word Usage; Related Forms; Foreign Roots, Prefixes and Suffixes that form Technical Words; Conversational Expressions, Formal And Informal Expressions

for Scientific and Technical Communication; Antonyms and Synonyms; Frequently Confused, Misused and Misspelled Words; Transitional Words and Phrases; Choosing Appropriate Words that Communicate.

The Most Commonly Used Grammatical Items in Technical: Major Tense Distinctions; Articles; Modal Verbs; Connectives; Relative Clauses; Noun/Nominal Compounds.

Mechanics and Punctuation: Abbreviations; Capitalisation; Number Usage; Sentence Punctuation; Word and Phrase Punctuation.

~~Common Grammatical and Stylistic Errors In Professional Communication: Structural Ambiguity; Agreement between Subject and Verb; Agreement between Pronoun and Antecedent; Faulty or Vague Pronoun Reference; Sentence Fragments; Fused Sentences and Comma Splices; Misplaced/Dangling Modifiers; Parallelism; Embedding sentences within sentences; Wordiness; Inappropriate Jargon.~~

BOOKS RECOMMENDED:

- [1] T N Huckin & L A Olsen, *Technical Writing and Professional Communication*, McGraw-Hill, Inc.
- [2] S J Gerson & S M Gerson, *Technical Writing*, 3/e, Pearson Education Asia, 2002.
- [3] A Esenberg, *A Begineer's Guide to Technical Communication*, McGraw-Hill,
- [4] S E Pauley and D G Riordan, *Technical Report Writing Today*, Houghton Mifflin Company
- [5] A J Rutherford, *Basic Communication Skills for Technology*, Pearson Education Asia
- [6] R V Lesikar, J D Perrit, Jr., & ME Flatley, *Lesikar's Basic Business Communication*
- [7] C L Bovee, J V Thill & B Schatzman, *Business Communication Today*, 7/e, Pearson Education, 2002
- [8] S Ober, *Contemporary Business Communication*, Houghton Mifflin Company, 5/e, Wiley-Dreamtech, 2005.
- [9] R C Sharma and K Mohan, *Business Correspondence and Report Writing*, Tata McGraw-Hill, 2002
- [10] G Leech & J Svartvik, *A Communicative Grammar of English*, Longman Group UK Ltd, Pearson Education 2002

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- 1			
Subject Code & Name	Instructions Hours per Week			Credits			
SSR1S1: Technical English	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To develop the English communication skills in terms of reading, writing and understanding of Engineering terms.
- To develop the technical ideas in English and to be able to express the technical ideas.

Pre requisites: Basic knowledge of English and communication skills

COURSE OF CONTENTS

UNIT I

Basic of technical communication: **Meaning of technical communication**; process of communication; Forms of communication: Verbal and Non-verbal; technology-enabled communication; Barriers to communication; Essentials of effective communication; Types of communication; Defining audiences for technical communication; **Aspects of communication: Global, Ethical and Legal.**

UNIT II

Professional correspondence: Qualities of professional correspondence: Goodwill techniques; Types of correspondence: Letters, Memos, E-mails; Business Letters: Elements of a Letters, Basic Letter Formats; Types of Business Letters: Positive Letters, Negative Letters, Inquiry Letters, Sales Letters, Complain and Adjustment Letters. Memos: **Meaning and Format of Memos.** Writing job application letters & Designing Resumes; **Meeting and Minutes.**

UNIT III

Technical Writing: Meaning & Concept of Technical Writing: Process of Technical Writing: Forms of Technical Writing: Technical Description, Summaries, Instructions & User Manuals: Technical Reports: Meaning and Essentials of Good Report Writing: Classification of Reports; Report Formats: Formal and Informal; Common Informal Technical Reports: Progress Reports, Lab Reports, Feasibility reports, Problem Solving Reports.

UNIT IV

Reading Comprehension; Precis Writing; **Expansion of an idea; Dialogue Writing; Paragraph Writing (Related to Technical Communication).**

UNIT V

Foreign Words & Phrases; Antonyms and Synonyms; Transitional Words and Phrases; Articles, Use of Prepositions, Modal Verbs, Connectives, Relative Clauses, Noun/Nominal Compounds: Correction of Sentences and Homophones; Punctuation, Abbreviations, Capitalization and Number Usage; Use of Technical Words and Jargons.

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply various technical terms and terminologies practically

- The course aims at developing the fundamentals of Technical English and mastery in the professional writing like Business letters, Business correspondence .designing Business Memorandum, Resume and E-mail writing.
- Will be able to write formal and informal reports in work place.
- Will have complete knowledge of comprehending different passages and Precis writing.
- Apply various grammatical skills practically.

BOOKS RECOMMENDED:

- [1] A. Esenberg, A Beginner's Guide to Technical Communication, McGraw-Hills.
- [2] A. J. Rutherford, Basic Communication Skills for Technology, Pearson Education Asia.
- [3] C. L. Bovee, J. V. Thill & B Schatzman, Business Communication Today, 7/e, Pearson Education, 2002.
- [4] R. V. Lesikar, J. D. Perrit, Jr., & ME Flatley, Lesikar's Basic Business Communication.
- [5] R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Tata McGraw-Hill, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE I Year (Common to all branches) Semester						
Subject Code & Name		Instructions Hours per Week			Marks					
1ME056 Workshop Practice		L	T	P		TH	CW	SW	PR	Total
		-	-	4	Max	-	-	75	75	150
Duration of Theory Paper: Only practical examination.					Min	-	-	38	38	76

Course Objectives: To develop the basic working skills with engineering tools & machines along with the practical understanding of engineering materials, processes and manufacturing.

Prerequisite(s): nil

COURSE OF CONTENTS

Introduction of and practice work on the following trade shops, processes, tools, material and their application in manufacturing:

1. Smithy
2. Fitting
3. Carpentry
4. Welding
5. Foundry
6. Machine shop
7. Plumbing Shop

BOOKS RECOMMENDED:

- [1] W A J Chapman, *Workshop Technology, Vol-I/II*, Elsevier Butterworth Heinenman, 5/e,
[2] S.K.Hajra Choudhury, *Elements of Workshop Technology*, Media Promoters of Publishers

Devi Ahilya University, Indore, India Institute of Engineering & Technology				BE-I Year (Common to all branches) Semester- I & II			
Subject Code & Name	Instructions Hours per Week			Credits			
MER1C5: Workshop Practice	L	T	P	L	T	P	Total
	0	1	2	0	1	2	3
Duration of Theory Paper: Only practical examination.							

Learning Objectives:

- To develop the basic working skills with engineering tools and machines
- To develop the practical understanding of engineering materials, processes and manufacturing.

Prerequisite(s): nil

COURSE OF CONTENTS

Introduction of and practice work on the following trade shops, processes, tools, material and their application in manufacturing:

1. Smithy
2. Fitting
3. Carpentry
4. Welding
5. Foundry
6. Machine shop
7. Plumbing Shop

Learning Outcomes:

Upon Completing the Course, Student will able to:

- To prepare simple wooden joints using wood working tools
- To Produce Fitting jobs as per specified dimensions
- To prepare simple lap, butt, T-, joint and Corner joints using arc welding equipment.
- To create gating elements in foundry shop.
- Learn to the essential parts of lathe machine as well perform the basic operation on lathe machine.
- To create threading operation in plumbing shop.

BOOKS RECOMMENDED:

- [1] W. A. J. Chapman, Workshop Technology, Vol-I/II, Elsevier Butterworth Heinenman, 5/e.
[2] S.K. Hajra Choudhury, Elements of Workshop Technology, Media Promoters of Publishers.

Academic Year: July-2015 to June-2016
 Programme: M.E. I (FT)

Branch : Electronics and Telecommunication (with specialization in Digital Communication)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	SET503	Advance Digital Communication	DCR1C1	Modern Communication System	60%
2	SET502	Embedded Microcontroller	DCR1C2	Embedded System using ARM Microcontroller	100%
3	SET501	Advance Computer Networking	DCR1C3	Advance Computer Networking	15%
4	SET504	Programming Language for Communication systems	DCR1E2	Object Oriented Programming	0%
5	SET505	Advance Logic Design	DCR1G1	Advance System Design	80%
6			ASR1S1	Soft Skills - 1	100%
7			DCR1W1	Seminar/ Workshop/Research Tool	100%
8	SET551	Modeling, Simulation and Evaluation Techniques	DCR2C1	Modelling and Simulation	5%
9	SET554	Mobile Communication	DCR2C2	Mobile Communication Networks	60%
10	SET559	VLSI Technology	DCR2E1	Analog and Digital CMOS Circuit Design	20%
11			DCR2C3	System Design Using Verilog	100%
12			DCR2G1	Broadband Access Technology	100%
13			ASR2S2	Soft Skills -2	100%
14			DCR2W2	Seminar/ Workshop/ Research Tool	100%
15	SET552	Advance Digital Signal Processing			
16	SET553	VHDL for Communication Systems			
Average % change in ME program = Total average / 2 =					67%
Average % change in ME program = Total average / 2 =					33.50%

S.V. Redekar
 5.12.18

Pringrf

Star
 5/11/17

Meinal
 5/11/17

Chavris

SR

Dankhi
 5/11/17

5/11/17

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) I - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5ET503 Advanced Digital Communication	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems like in Mobile communication, Wireless Local area Networks.

To develop skills to analyze these processes using basic Fourier techniques.

To evaluate performance of a digital communication system using the Matlab function.

To develop an orientation towards research in telecommunication engineering.

Prerequisite(s):

Basic knowledge of digital communication.

COURSE OF CONTENTS

UNIT -I

~~Review of Fourier Techniques and its application for Linear System analysis, Fourier Transform Properties, Classification of Signals, Spectral Density, Autocorrelation, Random Signals (random Variables, Random Processes, Stationarity, Time Averaging and Ergodicity), Noise in Communication Systems, Bandwidth of Digital Data.~~

UNIT -II

~~Formatting and baseband Modulation and Demodulation - Sampling & quantization, Non uniform Quantization, Digital Encoding Techniques, PCM, DPCM, ADPCM, DM, ADM, Line Coding NRZ, RZ, Bi phase, Duo binary etc., their comparison and Spectrum associated with their waveforms, Detection of Binary Signals in Gaussian Noise, Maximum Likelihood Receiver Structure, Matched filter, Correlator, Error Probability Performance of Binary signaling, M-ary Pulse Modulation, Pulse Shaping, Duo binary Signaling, Eye Patterns.~~

UNIT -III

Band Pass Modulation and Demodulation- Digital Band pass Modulation Techniques binary PSK, DPSK, QPSK, M-ary PSK, QAM, M-ary FSK, MSK, GMSK their Generation, Signal Space representation, Band-width requirements, Detection (Coherent, Non-coherent), Performance analysis and Comparison in presence of noise.

UNIT -IV

Selected topics in Digital Communication- Digital transmission in Fading Multipath Channels, Types of Fading, Mitigating the Effects of Fading, Spread Spectrum Communication Systems, Generation of PN Sequences, Direct Sequence Spread Spectrum, Frequency Hopped Spread Spectrum, Its applications to communication systems, Multi Carrier Modulation and OFDM, An OFDM system Implemented via FFT Algorithms, Application of OFDM.

UNIT -V

An Introduction to Information Theory, The Source Coding Theorem, Huffman and Lempel-Ziv Source Coding Algorithms, Modeling of Communication Channels, Channel Capacity, Bounds on Communication, Types of Error Control, Linear Block Codes, Generator Matrix, Parity Check Matrix, Error Correction and Syndrome Testing, Minimum Distance of a Linear Code, Cyclic Codes, Hamming Codes, BCH Codes, Convolutional Encoding, State, Tree, Trellis Diagram, Maximum Likelihood Decoding, Hard and Soft decisions, Properties of Convolutional Codes, Finite Fields, R-S Coding and Decoding, Introduction to Interleaving and Concatenated Codes.

BOOKS RECOMMENDED

- [1] Bernard Sklar, "Digital Communication", Pearson Education, 2nd Edition, 2004.
- [2] J.G.Proakis & M.Salehi, "Fundamentals of Communication Systems", Pearson Education, 2006.
- [3] J.G.Proakis, "Digital Communication", McGraw Hill, 4th Edition, 2001.
- [4] Taub & Schilling, "Principles of Communication System, 2nd Edition, TMH
- [5] Lathi B. P., "Modern Analog and Digital Communication Systems, 3rd Edition, Oxford Univ. Press.,
- [6] Haykins Simon, "Digital Communication, 3rd Edition, Wiley Publication.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credits			
DCRIC1 Modern Communication System		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Course Objectives: To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems. To analyze and evaluate performance of a digital communication system.

Prerequisite(s): Basic knowledge of digital communication

COURSE CONTENTS

UNIT -I

Review of basic concepts of communication systems, Source encoding, Speech encoding techniques (Source encoders, SBC, LPC, Hybrid coders), their applications, Base-band modulation techniques their comparison and spectrum associated with their waveforms.

UNIT -II

Channel coding-Linear Block Codes, Convolution Codes, Turbo Codes their encoding and decoding, introduction to high level channel codes, interleaving and concatenated codes. Digital modulation and demodulation - PSK, DPSK, QPSK, M-aryPSK, QAM, MSK and GMSK their generation, detection & performance analysis and comparison in presence of noise.

UNIT –III

Multi-carrier modulation and OFDM, Orthogonality, Block diagram of OFDM, Applications of OFDM, **Issues in OFDM** systems. Spread spectrum systems: Types, PN sequences, Characteristics of PN sequences, generation and detection of DSSS and FHSS, Spreading gain, Applications to communication systems, **Multi-user detection**.

UNIT –IV

Wireless channels and propagation path loss models – ISI, Types of fading, models for multi-path reception, propagation models for wireless networks, Fading mitigation techniques, **Equalization principle and types (LTE, ZFE, MMSE and DFE)**.

UNIT –V

Diversity techniques (frequency, time, and space), Multi-antenna systems, Smart antennas, Beamforming and MIMO system, spatial multiplexing, Tradeoffs among Diversity, Beamforming gain & spatial multiplexing, Introduction to Cognitive Radio and Cooperative communication.

BOOKS RECOMMENDED

- [1]. Bernard Sklar, “*Digital Communication*”, Pearson Education, 2nd Edition, 2004.
- [2]. J.G. Proakis, *Digital Communication*, McGraw Hill, 4th Edition, 2001.
- [3]. Lathi B. P., *Modern Analog and Digital Communication Systems*, 3rd Edition, Oxford Univ. Press, 2010.
- [4]. Haykins Simon, *Digital Communication*, 3rd Edition, Wiley Publication, 2005.
- [5]. I.S. Misra, *Wireless Communications and Networks*, 2nd Edition, TMH, 2009.
- [6]. A. F. Molisch, *Wireless Communications*, 2nd Edition, Willey, 2014.
- [7]. T. S. Rappaport, *Wireless Communications Principles & Practice*, 2nd Edition, PHI, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) I SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET502 Embedded Microcontroller	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

Designing microcontroller hardware, understanding use of timers and interrupts in different applications ability to serially transmit-receive the data at standard baud rate with an interface, using microcontroller in industrial applications, embedded software architecture

Prerequisite(s):

Knowledge of microprocessor, peripherals, interfaces and assembly language programming

COURSE OF CONTENTS

UNIT -I

~~Microprocessor and microcontroller comparison, microcontroller survey, 8051 architecture General purpose registers, special function registers, input/output ports and circuits, internal memory connecting external memory, and I/O interface 8255 ,data transfer, arithmetic, logical, branch instructions, bit related instructions , assembly language programming~~

UNIT -II

~~Interrupts ,timer flag interrupt , serial port interrupt ,external interrupt ,interrupt control, interrupt priority interrupt destination , software generated interrupts , counter and timers , timer modes of operation ,timing subroutines- pure software time delay, software polled timer, pure hardware delay, look up tables~~

UNIT -III

~~Serial data communication, different modes , serial data transmission reception using time delay , by polling , interrupt driven , microcontroller applications as interfacing with keyboard and display devices A/D and D/A converters , waveform generation , frequency and pulse width measurement, stepper motor control etc.~~

UNIT -IV

~~8051 family members as 8052 with capture timer, A/D and D/A equipped family members, watch dog timer, pulse width modulation, analog comparators, PIC 16C6X/7X,16 F8XX microcontroller and architecture , industrial applications of microcontroller~~

UNIT -V

~~Software architectures Round robin, Round robin with interrupts, function queue scheduling, Real time operating system architecture— task states, scheduler, reentrancy, shared data problem, interrupt latency RTOS semaphores and problems , inter task communication with message queues, mailboxes and pipes, Basic design using real time operating system~~

BOOKS RECOMMENDED

- [1] Mohamed. Ali Mazidi, Janice Ali Mazidi, Rolin D. McKinley, *"The 8051 microcontroller & Embedded System*, 2nd Edition Pearson Education, 2006
- [2] Kenneth J.Ayala, *8051 microcontrolle r, Architecture, Programming & Applications*, Penram international publishing (India) Pvt Ltd, 1996
- [3] David E. Simon, *An Embedded software Primer*, 1st Pearson education, 1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1C2 Embedded System using ARM Microcontroller	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller-based embedded systems. High-level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects.

Prerequisite: Knowledge of Microprocessor and C++ Programming.

COURSE CONTENTS

UNIT-I

Introduction: Definition of Embedded System, Embedded Systems Vs General Computing Systems, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Core of the Embedded System: General Purpose and Domain Specific Processors, Embedded system architecture: RISC and CISC, RISC: Introduction of ARM Processors, Evolution of ARM, ARM design philosophy, ARM Processor fundamentals: Data flow model, Registers, Program Status Register, Pipeline, Interrupts and Vector Table, ARM Processor Families and Nomenclature.

UNIT -II

ARM Basic Instruction Set: Introduction to 32 bit programming, Instruction Set Architecture of ARM, Addressing modes, Data Processing Instructions, Branch Instructions, Load and Store Instructions, Conditional Instructions, PSR Instructions, Stack Instructions.

UNIT -III

ARM Thumb Instruction Set: Overview, Branch instructions, Data processing instructions, Status register access instructions, Single register load and store instructions, Multiple register load and store instructions, Semaphore instructions, Coprocessor instructions, Stack Instructions, Interrupt Instructions.

UNIT -IV

ARM Programming- Assembly Language Programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, Register Allocation, Conditional Execution and Loops. C programming for ARM: Simple C program using function, pointers, structures, etc, Exception Handling, Interrupts, Interrupt Handling Schemes

UNIT -V

Interfacing and applications programs for LCD display, PWM, ADC, DAC application, measurement and control of physical parameter as temperature, stepper motor control, DC motor control etc.

Books Recommended:

- [1]. "ARM System Developer's Guide Designing and Optimizing System Software" by Andrew N. Sloss, Elsevier publication, 2004.
- [2]. Arm System-On-Chip Architecture, 2/E, by Par Furber, Pearson Education Limited, 2000.
- [3]. "EMBEDDED SYSTEM DESIGN", By Par Santanu Chattopadhyay, PHI Learning Private Ltd., 2013.
- [4]. "Embedded Microcomputer Systems, Real Time Interfacing, by Jonathan W. Valvano – Brookes /Cole, 1999, Thomas Learning.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) I-SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET501 Advance Computer Networking	L	T	P		TH	CW	SW	PR	Total
	3	-	-	Max	100	50	-	-	150
	Duration of paper: 3 hrs			Min	50	25	-	-	75

Course Objectives:

Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.

Prerequisite(s):

Fundamentals of computer networking, concepts of programming and operating systems.

COURSE OF CONTENTS

UNIT -I

Introduction and overview of OSI reference model, TCP/IP reference model, and ~~physical layer its functions,~~ data link layer, MAC sub layer, their functions, overview of data link layer and Mac sub layer protocols (stop & wait, sliding window, aloha, CSMA, CSMA/CD, CSMA/CA).

UNIT -II

~~Network layer Design Issues, Routing Algorithms Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing, and Routing in Ad Hoc Networks. Congestion Control Algorithms, General Principals , Prevention Policies, Congestion Control in, Virtual Circuit Subnets, Datagram Subnets, Load shedding, Jitter Control.~~

UNIT -III

~~Quality of Services, Requirements, Techniques for Achieving Q OS, Internetworking, Tunneling, and Internet work Routing, Network Layer in the Internet, IP Protocol, IP Addresses, OSPF, BGP, Internet Multicasting, Mobile IP IPV6.~~

UNIT -IV

~~Transport Service, Services Provided to Upper Layers. Transport Primitives, Berkeley Sockets, Elements of Transport Protocols, Addressing, Introduction to UDP, Introduction to TCP, TCP Service Model, TCP Protocol, TCP Segment Header. Performance Problems in Computer Networks, Network Performance Measurements. System Design for Better Performance.~~

UNIT -V

Various Application Layer Protocols DNS, SMTP, IMAP, WWW, Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, Symmetric and Asymmetric Key Algorithms, DES, RSA, Digital Signature.

BOOKS RECOMMENDED

- [1] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
- [2] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- [3] W. Stalling, "Data & Computer Communication", 8th Edition Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1C3 Advance Computer Networking	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.

Prerequisite(s): Fundamentals of computer networking, concepts of programming and operating systems.

COURSE CONTENTS

UNIT-1

Network Models, OSI Model, TCP/IP Protocol Suite, Addressing, Data Rate Limits, Performance Parameters, Transmission Media, Switching, Data Link Layer, Error Detection and Correction techniques.

UNIT-2

Data Link Control- LLC, HDLC , Multiple Access, Random Access, Wired LANS- Standard Ethernet, Fast Ethernet , Gigabit Ethernet , Wireless LANS, Bluetooth, Connecting Devices.

UNIT-3

Network Layer- Logical Addressing, IPV4 Addresses, IPV6 Addresses, Transition From IPV4 to IPV6, Address Mapping, ARP protocol, ICMP, Unicast Routing Protocols, Multicast Routing Protocols, Routing in Autonomous System

UNIT-4

Transport Layer- Process-To-Process Delivery, User Datagram Protocol (UDP), TCP, SCTP, Congestion Control, Quality of Service, Techniques to Improve QoS

UNIT-5

Application Layer- Domain Name System, Electronic Mail, File Transfer Protocol, HTTP, WWW, Remote Login (TELNET, SSH), Simple Network Management Protocol (SNMP), Internet Security- Network Layer Security, Transport Layer Security and Application Layer Security, Firewalls

BOOKS RECOMMENDED

- [1] B. Forouzan, "TCP/IP Protocol Suite", McGraw Hill,3/e,2006
- [2] Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP Vol. II design, Implementation of Intranets:, PHI, 3rd Edition 2000
- [3] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
- [4] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- [5] B. Forouzan, "Data Communication and Networking" 4th Ed Tata McGraw Hills

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) I - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET504 Programming Language for Communication Systems Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Course Objectives:

To understand and learn a programming language that expressly designed for use in the distributed environment of the technology along with an ~~object oriented programming model~~.

Prerequisite(s):

Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C, Smalltalk, Eiffel, Common LISP Object System (CLOS), Object Pascal, and ADA-95 etc.

COURSE OF CONTENTS

UNIT -I Introduction to Object Oriented Programming and Java :

Object Oriented Concepts, Abstraction, Encapsulation, Information Hiding. Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods

UNIT -II

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

UNIT -III

Exception Handling, Multithreading and Introduction to Java APIs:

Exceptions: Need for exceptions, Checked V/s Unchecked exceptions, creating exceptions.

Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle. String Handling, Wrapper classes: Arrays and Vectors

UNIT -IV

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

UNIT -V

Introduction to elementary procedures, Real & Complex vector and Matrix & Determinants and operations like: Initialization, Duplication, Elimination, Interchanging, Rotation, Norms, Scaling, Multiplication & calculation of rank etc.

Evaluation of various polynomials like Chebyshev polynomial, Fourier polynomial etc.

Analysis of real matrix problems like: Overdetermined systems, underdetermined system, homogenous, pseudo inversion. Sparse Real matrices, Similarity Transformation, Eigen value problems.

Numerical differentiation, Differential equations,

Introduction to special functions like: Exponential, Gamma, Error, Infinite time series, Fast Fourier transforms etc

BOOKS RECOMMENDED

[1] Hang T. Lau, *A Numerical Library in Java for Scientist & Engineers*, Library of Congress Cataloging-in-Publication Data by Chapman & Hall/ CRC Press Company.

[2] Cay S.Horstmann, *Core JAVA Vol-1*, Pearson Education.

[3] Herbert Schildt, *The complete Reference*, Tata McGraw Hill

[4] Kathy Sierra, *Bert Bates, Head First Java*, 2nd Edition, Oreilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR1E2 Object Oriented Programming	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: The aim of the course is to give a thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking.

Prerequisite(s): Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C.

COURSE CONTENTS

UNIT -I

Introduction to Object Oriented Programming and Java :

Object Oriented Concepts, Abstraction, Encapsulation, Information Hiding. Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods

UNIT -II

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

UNIT -III

Exception Handling, Multithreading and Introduction to Java APIs:

Exceptions: Need for exceptions, Checked V/s Unchecked exceptions, creating exceptions. Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle. String Handling, Wrapper classes: Arrays and Vectors

UNIT -IV

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

UNIT -V

Introduction to elementary procedures, Real & Complex vector and Matrix & Determinants and operations like: Initialization, Duplication, Elimination, Interchanging, Rotation, Norms, Scaling, Multiplication & calculation of rank etc., Evaluation of various polynomials like Chebyshev polynomial, Fourier polynomial etc., Analysis of real matrix problems like: Overdetermined systems, underdetermined system, homogenous, pseudo inversion. Sparse Real matrices, Similarity Transformation, Eigen value problems., Numerical differentiation, Differential equations, Introduction to special functions like: Exponential, Gamma, Error, Infinite time series, Fast Fourier transforms etc

BOOKS RECOMMENDED:

- [1] Hang T. Lau, *A Numerical Library in Java for Scientist & Engineers*, Library of Congress Cataloging-in-Publication Data by Chapman & Hall/ CRC Press Company.
- [2] Cay S. Horstmann, *Core JAVA Vol-1*, Pearson Education.
- [3] Herbert Schildt, *The complete Reference*, Tata McGraw Hill.
- [4] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, O'Reilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Communication) I – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET505 (Elective) Advanced Logic Design	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	50	25	-	-	75

Course Objective:

To provide an in-depth knowledge regarding designing of advance digital circuits. To emphasize on FSM based sequential circuit design and analysis of designed circuits for timing and performance.

Prerequisite: Knowledge of basic digital electronics and state diagrams.

COURSE OF CONTENTS

Unit-I

Background for Digital Design

Logic Function Representation and Minimization, K Map Minimization, EV K Map Minimization, Function Minimization by Using K map XOR Patterns and Reed Muller Transformation

Unit-II

Combinational Logic Design

No arithmetic Combinational Logic Devices— Multiplexers, Decoders, Encoders, De Multiplexers, Code Converters, Magnitude Converters, Parity Generators and Error Checking Systems, Combinational Shifters, Steering logic and Tri-state gate application.

Arithmetic Devices— Binary adders and subtractors, Carry Look-ahead Adder, Multiple number addition and Carry save adder, Multipliers, Parallel Dividers, Dedicated ALU design featuring RC and CLA Capability, Mux approach to ALU Design, Dual Rail system and ALU with completion signals.

Propagation Delay and Timing Defects in Combinational Logic-

Unit-III

Introduction to Synchronous State Machine Design and Analysis

Models for Sequential Machines, Basic Memory Cell, Flip flop, Flip-Flop Conversions, Asynchronous Preset and Clear overrides, Latches and Flip flop Timing Problems, Design of Synchronous state machine, Detection and elimination of output race glitches, static hazard in output logic, Clock Skew, Switch debouncing circuit, ASM chart and state tables.

Module and Bit Slice Devices— Registers, Synchronous binary counters, Shift register counters, Asynchronous counters.

Unit-IV

Asynchronous State Machine Design and Analysis

Features of Asynchronous FSM, Lumped path delay models, Excitation table for LPD model, State diagram, state table and excitation table for Asynchronous FSM, Basic cell design using LPD model, Design of RET Flip flops, Detection and elimination of timing defects, single transition time machines, Hazard free design, One Hot Design for asynchronous FSM.

Unit-V

Advance Sequential Designs

Externally Asynchronous/ Internally Clocked systems and Applications, Asynchronous Programmable Sequencers, One-hot Programmable asynchronous sequencers, Pulse mode approach to asynchronous FSM Design-

Books Recommended:

- [1] Richard.F.Tinder, "Engineering Digital design", 2nd Edition, 2000, Academic Press.
- [2] William I. Fletcher, " An Engineering Approach to Digital Design " , Prentice Hall of India, 1996.
- [3] James E. Palmer, David E. Perlman, " Introduction to Digital Systems " , Tata McGraw Hill, 1996.
- [4] N.N. Biswas, " Logic Design Theory " , Prentice Hall of India, 1993.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR1G1 Advance System Design		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Course Objective: To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite: Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit 1:

Introduction to digital IC design – full Custom and semicustom design flow and comparison , Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit 2:

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design-Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit 3:

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit 4:

Subsystem design principles-pipelining-Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model- Technology scaling effect on interconnect and -Noise in interconnects.

Unit 5:

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

BOOKS RECOMMENDED:

- [1]. John M Yarbrough, “Digital Logic Applications and Design”, Thomson learning
- [2]. Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata McGraw Hill Edition
- [3]. Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005.
- [4]. Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer, Third edition, 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP2S1: Soft Skill-1	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [3] Kumar Mahi. Stress Coping Skills Ebook, Health & Medicine, Technology, 2009.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) II - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET551 Modeling Simulation and Evaluation Techniques	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	50	25	-	-	75

Course Objectives:

- To give exposure of stochastic processes and to show their importance in engineering education and research
- To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results.
- To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes
- To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of Probability Theory.

COURSE OF CONTENTS

UNIT –I

Introduction to Probability Theory - Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables - Definition, Discrete and Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Distributions for Discrete and Continuous Random Variables, Geometric Distribution, Poisson Distribution, Uniform Distribution, Exponential Distribution, Normal Distribution, Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable, ~~Moment Generating Function.~~

UNIT –III

Markov Chains- Classification of Stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, ~~and Chapman-Kolmogorov Equation,~~ Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes and Queuing Theory-Introduction to Continues Time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Non Birth Death Processes, Exponential Distribution & Poison Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and ~~M/G/1~~ Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation.

BOOKS RECOMMENDED

- [1] K.S.Trivedi, “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, 2nd Edition , A Wiley-Interscience Publication.
- [2] Averill M. Law, W. David Kelton, “Simulation Modeling and Analysis”, 3rd Edition, Tata McGraw-Hill Publication.
- [3] S.M. Ross, “Introduction to Probability Models, 9th Edition, Elsevier Publication”, 2007.
- [4] A Papoulis, S.V Pillai, “Probability Random Variables and Stochastic Processes”, 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCR2C1 Modeling and Simulation	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: To give exposure of stochastic processes and to show their importance in engineering education and research To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s): Fundamental knowledge of Probability Theory.

COURSE CONTENTS

UNIT –I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernouli pmf, Bionomial pmf, Geometric pmf, Poisson pmf, Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable.

UNIT –III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes -Introduction to Continues Time Markov Chains, Birth nd Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

BOOKS RECOMMENDED

- [1]. S.M. Ross, “Introduction to Probability Models, 9th Edition, Elsevier Publication”, 2007.
- [2]. K.S.Trivedi, “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, 2nd Edition , A Wiley-Interscience Publication.
- [3]. Averill M. Law,W. David Kelton, “Simulation Modeling and Analysis”, 3rd Edition, Tata McGraw-Hill Publication.
- [4]. A Papoulis, S.VPillai, “Probability Random Variables and Stochastic Processes”, 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) II - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET554 – Mobile Communication	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

To provide the knowledge of different generation mobile communication system, cellular concept, and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite(s):

It is expected to know the following concepts: Electromagnetic spectrum, analog and techniques, Shannon Fano & Huffman coding, Channel coding theorem, Codes.

COURSE CONTENTS

UNIT -I

Introduction to wireless communication system. Conventional mobile system, Concept of cellular mobile system, Frequency Management Channel assignment, Co channel interference reduction, Handoff strategies and considerations, Cell capacity, Cell splitting, Sectorization of cells, Micro cell zone concept. Trunking and grade of service.

UNIT -II

~~Duplexing techniques, Comparison of FDMA and TDMA mobile systems, Principles of CDMA mobile system, Packet radio protocols, mobile radio propagation: Large scale path loss, Free space propagation model. Three basic propagation mechanism: Reflection, Diffraction, Scattering, Practical Link Budget design using path loss models, Outdoor propagation models. Small scale fading and multipath.~~

UNIT -III

~~Modulation Techniques for mobile radio, Equalization Techniques Diversity Techniques. RAKE Receiver, Channel coding, Speech coding technique.~~

UNIT -IV

Wireless system and standards: GSM system and architecture CDMA network (IS-95) : Architecture, Forward link, Reverse link, ~~IEEE 802.11 standard, IEEE 802.16 Standard, WCDMA, CDMA 2000. DECT standard, Architecture and protocols.~~ Up gradation for GSM:- HSCD, GPRS, EDGE.

UNIT -V

~~Mobile Network layer, Mobile transport layer, WAP, air interface, system development, mobile management, radio resource management, EIRP management, radio frequency monitoring, Quality of service, Mobile satellite system.~~

BOOKS RECOMMENDED

- [1] TS Rappaport "*Wireless Communication*" ,Pearson Education
- [2] Jacohen Schilling "*Mobile Communication*", Pearson Education

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR2C2 Mobile Communication Networks		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: To provide the knowledge of cellular concept, types of wireless networks, different generations mobile communication systems,, and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite(s): Knowledge of digital communication, OSI Model and internet protocol.

COURSE CONTENTS

Unit 1

Evolution of Modern Mobile Wireless Communication Systems: Different types of Wireless Communication, Classification of Wireless Networks: Wireless Local Area Networks, Personal Area Networks, Fixed Wireless Access, Ad-hoc and Sensor Networks, Satellite Cellular Communication, First Generation, Second Generation, Third Generation wireless Networks, All-IP Networks, Requirements for services, Technical Challenges of Wireless Communications.

Unit 2

Cellular Systems Design Fundamentals: Multiple access Techniques, Cellular Structure, Cell Cluster, Frequency Reuse, Co-channel and Adjacent channel Interference, Enhancement of system Capacity, Channel Assignment, Cellular Communication principles, Mobility Management, Radio Resource Management, 1G AMPS system.

Unit3

2G and 2.5 G Systems: GSM system architecture, Air interface, Logical and Physical Channels, Voice encoding, channel encoding, Cryptography, Frequency hopping, Equalization in GSM, Connection establishment and Handover, Protocols and Signaling, Services and Billing. GPRS system architecture, Signaling, Roaming, Interfaces and Related Protocols, IP internetworking Model, GPRS applications.

Unit 4

3G Systems: WCDMA/UMTS: System Overview, Air Interfaces, Physical and Logical Channels, Speech coding, Multiplexing, Channel Encoding, Spreading, Modulation, Power control, Connection Establishment, Handover. 3GPP LTE: System Overview, Physical Layer, Logical and Physical Channels, Physical Layer Procedures.

Unit 5

IP for Mobile Networks : Overview of IP, IP Routing protocols, Basic Mobile IP, IP for GPRS and UMTS, Integration of different Technologies, Mobility management in Wireless Networks, All IP Networks, Key technologies for 4G.

BOOKS RECOMMENDED:

- [1]. A. F. Molisch, "Wireless Communications", Second Edition, Wiley Publications, 2014.
- [2]. I. S. Misra, "Wireless Communications & Networks", Second Edition, MGH, 2013.
- [3]. J. Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) II – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET559 (Elective) VLSI Technology	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	50	25	-	-	75

Course Objectives:

This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisite(s):

Knowledge of semiconductor devices is required.

COURSE OF CONTENTS

UNIT -I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process.

Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT -II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ration, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT -III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT -IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

UNIT -V

~~**Layout:** Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter Circuit, circuit Extraction from Layout. Limitations of CMOS in NANO scale circuit design.~~

BOOKS RECOMMENDED

- [1] Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
- [2] R. Jacob Baker, Harry W. Li and David E. Boyce, *CMOS Circuit design, layout and Simulation*, Series Edition, PHI, IEEE press,
- [3] Yuan Taur and Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Special Edition, Cambridge university press,1998
- [4] Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*,2nd Edition, PHI,.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR2E1 Analog and Digital VLSI Circuit Design		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT -I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT -II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT -III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT -IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit –V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation

BOOKS RECOMMENDED

- [1]. Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
- [2]. [Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, 2nd Edition, PHI, (anded), AW/Pearson, 2001.
- [3]. CMOS mixed-signal circuit design by R. Jacob Baker Wiley India, IEEE press, reprint 2008.
- [4]. Design of analog CMOS integrated circuits by Behad Razavi McGraw-Hill, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR2C3 System Design Using Verilog		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog .Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s): Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

UNIT –I

Overview of Digital Design with Verilog HDL -Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts -Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts -Lexical conventions, data types, system tasks, compiler directives.

UNIT -II

Modules and Ports-Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling -Modeling using basic Verilog gate primitives, description of andlor and buflnot type gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling -Continuous assignments, delay specification, expressions, operators,operands, operator types.

UNIT -III

Behavioral Modeling -Structured procedures, initial and always, blocking and nonblocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation.

Useful Modeling Techniques -Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

UNIT -IV

Timing and Delays -Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling- MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

UNIT -V

Logic Synthesis with Verilog HDL-Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

BOOKS RECOMMENDED

- [1] Samir Palnitkar , “Verilog HDL-A guige to Digital Design and Synthesis “ 2nd Edition, Pearson , 2006.
- [2] J. Bhaskar, “A Verilog HDL Primer”, B.S Publications,
- [3] Douglas J. Smith, “Hdl Chip Design : A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog”.Doone Pubns ,1998.
- [4] Blaine Readler , “Verilog by Example: A Concise Introduction for FPGA Design”, Full Arc Press, 2011

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCR2G1 Broadband Access Networks		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Course Objectives: To provide a detailed structure and working of different networks used for accessing broadband signals.

Prerequisite(s): knowledge of analog and digital communication and basic.s of computer networks

COURSE CONTENTS

Unit 1

Introduction: Broadband access, Its definition, coverage and economic impact, Legacy broadband technologies, Fixed wireline broadband technologies (Digital subscriber line, Cable modem, Broadband over power line), Fixed wireless broadband technologies (MMDS, Free space optics , Satellite) Mobile wireless broadband technologies (GPRS, EDGE, UMTS).

Unit2

WLAN: Types, System architecture, Protocol Architecture, Medium access control CSMA/CA, Comparison of IEEE variants of WLAN (IEEE 802.11 – 802.11 ac), Frame formats, Modulation and coding, High Throughput WLANs., Wi-Fi based Wireless Mesh Networks.

Unit 3

WiMax: System Overview, Fixed Wi-Max, Mobile Wi-max, Physical Layer Overview (Modulation and coding, Physical and logical channels, Multiple antenna Techniques, Link Control), MAC Layer, Multihop relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks.

Unit 4

Optical Networking: Introduction and challenges- Advantages of optical network, WDM optical networks, WDM network evolution, WDM network construction, broadcast and select optical WDM network, wavelength routed optical WDM network, Challenges of optical WDM network .**Optical Access Network** Introduction to access network, PON, EPON , GPON and WDMEPON: overview, principal of operation, architecture, standards; dynamic Bandwidth allocation and Quality of Service.

Unit 5

Optical switching & FiWi access networks Optical packet switching basics, slotted and unslotted networks, header and packet format, contention resolution in OPS networks, self routing, examples on OPS node architecture, optical burst switching, signaling and routing protocols for OBS networks, contention resolution in OBS networks, Radio over Fiber, Radio and Fiber, Integration of EPON and WiMax, Hybrid Wireless-Optical Broadband Access Network / Fiber wireless (FiWi) access networks.

BOOKS RECOMMENDED:

- [1]. Optical Network Series: Biswanath Mukherjee, Springer, 2006.
- [2]. Optical Networks: R.Ramaswami and K.Sivarajan, Morgan Kaufmann Publishers, 2nd ed., 2002.
- [3]. A. F. Molisch, "Wireless Communicatins", Second Edition, Wiley Publications, 2014.
- [4]. Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.
- [5]. 3. Optical Switching Networks: Mayer & Martin, Cambridge University Press, 2008.
- [6]. Broadband Access Networks -Technologies and Deployments, Editors: Shami, Abdallah, Maier, Martin, Assi, Chadi (Eds.) , Springer, 2009.
- [7]. FiWi Access Networks, [Martin Maier](#), [NavidGhazisaidi](#), Cambridge University Press,2011.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR2S2: Soft Skill-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics Groups – Definition & Meaning, Stages & Process of Group Formation, types,

Work Group Behavior – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining Team:

Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics Power & Politics:

Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
- [3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ramneek Kapoor, Managerial Skills, Pathmaker Bangalore, Nakoda Publishers & Printers, 1st Ed.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) II - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET552 Advance Digital Signal Processing	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s):

A basic course in Digital signal processing.

COURSE OF CONTENTS

UNIT-I

Signals and Signal Processing: Characterization and Classification of signals; Sampling and Quantization; Typical signal Processing Operations; Examples Typical Signals and Systems; Typical Signal Processing applications; Why Digital Signal Processing; Building blocks of a Digital signal processor; Discrete Time Fourier Transform, Z-transform and properties.

UNIT-II

Discrete Fourier Transform: Introduction; Computation of DFT and IDFT; Periodic and symmetry properties of DFT; DTFT v/s DFT; Circular shift and Circular convolution Linear convolution using DFT; Block convolution, Overlap-add method and Overlap-save method.

UNIT-III

Fast Fourier Transform: Radix Two DIT and DIF FFT algorithm; Butterfly computation; Bit reversed mapping; In place computation; Composite-N algorithm; Prime factor algorithm.

UNIT-IV

Digital Filter Structures: Block Diagram Representation; Signal Flow Graph Representation; Equivalent structures; Basic FIR Digital Filter structures; Basic IIR filter structures; state space structure; All Pass Filter; Tunable HR Digital filters; Cascaded lattice realization of IIR and FIR Filters; Parallel all Pass Realization of IIR Transfer Function; Computational Complexity of Digital Filter structures; Tellegen theorem and its applications.(Transposition theorem and Network sensitivity formula.)

UNIT-V

Digital Filter Design: Brief Review of Analog Filter Design; Impulse Invariance method of IIR filter design; bilinear Transform Method of IIR Filter Design; Design of Digital HR notch Filters; Low Pass HR digital filter design based on Truncated Fourier Series; FIR Filter Design Based on Frequency Sampling Approach; computer aided design of digital filters. Introduction to speech and language processing.

BOOKS RECOMMENDED

- [1] Sanjit K. Mitra; *Digital Signal Processing A Computer- Based Approach*; 9th Edition, Tata McGraw Hill .
- [2] V.K.Khanna;*Digital Signal Processing; Telecommunications and Multimedia Technology* Wheeler Publishing 1999.
- [3] Richard G. Lyons *Understanding Digital Signal Processing*; .; First Indian Reprint ,Addison Wesley Longman Inc 1999.
- [4] B. Somanathan Nair “*Digital Signal Processing, Theory, analysis and Digital filter design*”; PHI New Delhi India 2005.
- [5] A. V. Oppenheim and R. W. Schaffer “*Digital Signal Processing*”

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) II - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET553 VHDL for Communication Systems	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL .Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s):

Digital Design, Microprocessor architecture, C++ language.

COURSE OF CONTENTS

UNIT – I

Introduction to VLSI

History of IC Design, IC Technology, Moore’s Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski’s Y Chart.

UNIT – II

FPGA and CPLD

ROMs, Logic array (PLA), Programmable array logic, GAL, bipolar PLA, NMOS PLA, PAL 14L4, Xilinx logic cell array (LCA) I/O Block Programmable interconnect Xilinx 3000 series and 4000 series FPGAs. Altera CPLDs, altera FLEX 10K series PLDs.

UNIT – III

Introduction to VHDL

Digital system design process , Hardware simulation , Levels of abstraction , VHDL requirements , Elements of VHDL Top-down design, VHDL operators ,Timing ,Concurrency ,Objects and classes , Signal assignments ,Concurrent and sequential assignments.

UNIT – IV

Modeling Techniques and Advance Topics

Entity Declaration, Architecture Body, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers, Block statements, Component declaration and Instantiation, Concurrent Assignment statements, Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Generate statements, Attributes, Hardware Modeling Examples: Modeling of digital modulator and demodulators, digital filters, WAP protocols, network security modules, wireless signal reception modules etc.

UNIT – V

Design for Synthesis

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints.

Text

1. J. Bhasker, “VHDL”, 3rd Edition, Addison Wesley, 1999.

BOOKS RECOMMENDED

- [4] P.K. Chan & S. Mourad, “Digital Design sing Field Programmable Gate Array” 1st Edition, Prentice Hall, 1994.
- [5] J. V. Old Field & R.C. Dorf, “Field Programmable Gate Array”, John Wiley, 1995.
- [6] M. Bolton, “Digital System 2WDesign with Programmable Logic”, Addison Wesley, 1990.
- [7] Sudhakar Yalamanchili, “Introductory VHDL- From Simulation to Synthesis”, 3rd Indian Reprint., Pearson Education,
- [8] Douglas Perry, “VHDL”, 3rd Edition, McGraw Hill 2001.

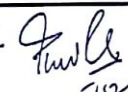
Academic Year: July-2015 to June-2016

Programme: M.E I (FT)

Branch : Electronics and Instrumentation Engg. (Digital Inst.)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1			DIR1C1	INDUSTRIAL TRANSDUCERS AND SMART SENSORS	100%
2	5EI302	EMBEDDED MICROCONTROLLER	DIR1C2	EMBEDDED SYSTEM USING ARM MICROCONTROLLER	100%
3	5EI303	DIGITAL CONTROL SYSTEM	DIR1C3	MODERN CONTROL SYSTEM	80%
4	5EI304	PROG.LANG.FOR INSTRUMENTATION SYSTEM/COMMUNICATION SYSTEMS	DIR1E2	OBJECT ORIENTED PROG.	20%
5			DIR1G1	ADVANCE SYSTEM DESIGN	100%
6			ASR1S1	SOFT SKILLS-1	100%
7	5EI301	ADVANCE COMPUTER NETWORKING			
8	5EI306	DIGITAL INSTRUMENTATION AND TECHNIQUES			
9			DIR2C1	DIGITAL IMAGE PROCESSING	100%
10	5EI354	PROCESS INSTRUMENTATION	DIR2C2	PROCESS INSTRUMENTATION AND INDUSTRIAL CONTROL	50%
11	5EI353	VHDL FOR COMM./INSTRU. SYSTEM	DIR2C3	SYSTEM DESIGN USING VERILOG	100%
12	5EI351	MODELLING AND SIMULATION	DIR2G3	MODELLING AND SIMULATION	2%
13			DIR2E3	OPTICAL AND LASER INSTRUMENTATION	100%
14			ASR2S2	SOFT SKILLS-2	100%
15	5EI352	ADVANCED DIGITAL SIGNAL PROCESSING			
16	5EI359	VLSI TECHNOLOGY			
Average % change =					79%
Average % change in BE program = Total average / 2 =					39.50%

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Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR1C1: Industrial Transducers and smart Sensors	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

Acquire the knowledge of basic principles of sensing various parameters. Learn comparative methods of selection of sensors for typical applications

COURSE CONTENT

Unit I

Temperature Measurement: Classification of temperature sensors, working principle, types, materials, Non electrical sensors (thermometer, thermostat), electrical sensors (RTD, thermocouple, thermistors), radiation sensors (pyrometers), temperature switch.

Pressure Measurement: Definition, working principle, types, materials, manometers, elastic pressure sensors, secondary pressure sensors, differential pressure sensors, force balance type, motion balance type, capacitive (delta cell), ring balance, vibrating cylinder type, high-pressure sensors, low-pressure sensors, pressure switch.

Unit II

Level Measurement: Working principle, types, materials, float, displacers, bubbler, and DP- cell, ultrasonic, capacitive, microwave, radar, radioactive type, laser type transducers, level gages, resistance, thermal, TDR/ PDS type, solid level detectors, fiber optic level detectors, level switch.

Flow Measurement: Working principle, types, materials, primary or quantity meters (positive displacement flow meter), secondary or rate meter (obstruction type, variable area type), electrical flow sensors (turbine type, electromagnetic type, and ultrasonic type), Flow switch.

Unit III

Force and Torque Measurement: Basic methods of force measurement, elastic force traducers, strain gauge, load cells, shear web, piezoelectric force transducers, vibrating wire force transducers, strain gauge torque meter, Inductive torque meter, magneto-strictive transducers, torsion bar dynamometer, etc. Dynamometer (servo control and absorption) instantaneous power measurement and alternator power measurement.

Unit IV

Allied Sensors: Standards, working principle, types, materials, design criterion: LLeak detector, flame detector, smoke detector, humidity, density, viscosity sensors, and digital transducers, sound sensors, and proximity sensors.

Advanced sensors: Working Principle, types, materials: Smart sensors, MEMS, nano sensors IC sensors, optical fiber sensors.

Unit V

Industrial Communication Systems: Introduction to interface, fieldbus, PROFIBUS-PA, foundation fieldbus.

Text and Reference books:

- [1] B. C. Nakra and K. K. Choudhari, "Instrumentation Measurements and Analysis", Tata McGraw Hill Education, Second ed., 2004.
- [2] Sabrie Soloman, "Sensors Handbook", McGraw Hill Publication, First ed., 1998.
- [3] A. K. Sawhney, "Electrical & Electronic Instruments & Measurement", Dhanpat Rai and Sons, Eleventh ed., 2000.
- [4] Dr. D. S. Kumar, "Mechanical Measurements and Control", 3/e, Reprint-2004, Metropolitan Book Co. Private Ltd., 2004.
- [5] B. E. Noltingk, "Instrumentation Reference Book", 2nd Edition, Butterworth Heinemann, 1995.
- [6] B. G. Liptak, "Process software and digital networks", 3rd Edition, CRC press, Florida.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) I – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI301 Advance Computer Networking Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Course Objectives:

Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.

Prerequisite(s):

Fundamentals of computer networking, concepts of programming and operating systems.

COURSE OF CONTENTS

UNIT-I

Introduction and overview of OSI reference model TCP/IP reference model, Physical layer & its functions, Data link layer, MAC sub layer, their functions, overview of data link layer and Mac sub layer protocols (stop & wait, sliding window, aloha, CSMA, CSMA/CD, CSMA/CA).

UNIT-II

Network layer Design Issues, Routing Algorithms Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing, and Routing in Ad Hoc Networks. Congestion Control Algorithms, General Principles, Prevention Policies, Congestion Control in, Virtual Circuit Subnets, Datagram Subnets, Load shedding, Jitter Control.

UNIT-III

Quality of Services, Requirements, Techniques for Achieving Q OS, Internetworking, Tunneling, and Internet work Routing, Network Layer in the Internet, IP Protocol, IP Addresses, OSPF, BGP, Internet Multicasting, Mobile IP IPV6.

UNIT-IV

Transport Service, Services Provided to Upper Layers. Transport Primitives, Berkeley Sockets, Elements of Transport Protocols, Addressing, Introduction to UDP, Introduction to TCP, TCP Service Model, TCP Protocol, TCP Segment Header. Performance Problems in Computer Networks, Network Performance Measurements. System Design for Better Performance.

UNIT-V

Various Application Layer Protocols DNS, SMTP, IMAP, WWW, Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, Symmetric and Asymmetric Key Algorithms, DES, RSA, Digital Signature.

BOOKS RECOMMENDED

- [1] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
 - [2] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- W. Stalling, "Data & Computer Communication", 8th Edition Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR1C2: Embedded System using ARM Microcontroller	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller-based embedded systems. High-level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects.

Prerequisite: Knowledge of Microprocessor and C++ Programming

COURSE CONTENTS

Unit I

Introduction: Definition of embedded system, embedded systems vs general computing systems, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, core of the embedded system: general purpose and domain specific processors, embedded system architecture: RISC and CISC, RISC: Introduction of ARM processors, evolution of ARM, ARM design philosophy, ARM processor fundamentals: data flow model, registers, program status register, pipeline, interrupts and vector table, ARM processor families and nomenclature.

Unit II

ARM Basic Instruction Set: Introduction to 32 bit programming, instruction set, architecture of ARM, addressing modes, data processing instructions, branch instructions, load and store instructions, conditional instructions, PSR instructions, stack instructions.

Unit III

ARM Thumb Instruction Set: Overview, branch instructions, data processing instructions, status register access instructions, single register load and store instructions, multiple register load and store instructions, semaphore instructions, coprocessor instructions, stack instructions, interrupt instructions.

UNIT IV

ARM Programming: Assembly language programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, register allocation, conditional execution and loops. C programming for ARM: Simple C program using function, pointers, structures, etc, exception handling, interrupts, interrupt handling schemes.

Unit V

Interfacing and Applications: Programs for LCD display, PWM, ADC, DAC application, measurement and control of physical parameter as temperature, stepper motor control, DC motor control etc.

Text and Reference Books:

[1] Andrew N. Sloss , “ARM System Developer’s Guide Designing and Optimizing System Software”, Elsevier publication, 2004.

[2] Par Furber, “Arm System-On-Chip Architecture”, 2/E , Pearson Education Limited, 2000.

[3] Par Santanu Chattopadhyay, “EMBEDDED SYSTEM DESIGN”, PHI Learning Private Ltd., 2013.

Jonathan W. Valvano, “Embedded Microcomputer Systems, Real Time Interfacing, Brookes /Cole, 1999, Thomas Learning.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) I – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI302 Embedded microcontroller	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
	Duration of paper: 3 hrs			Min	50	25	25	25	125

Course Objectives:

Designing microcontroller based hardware, understanding use of timers and interrupts in different applications ability to serially transmit-receive the data at standard baud rate with an interface, using microcontroller in industrial applications, embedded software architecture

Prerequisite(s):

Knowledge of microprocessor, peripherals, interfaces and assembly language programming

COURSE OF CONTENTS

UNIT-I

~~Microprocessor and microcontroller comparison, microcontroller survey, 8051 architecture General purpose registers, special function registers, input/output ports and circuits, internal memory connecting external memory, and I/O interface 8255, data transfer, arithmetic, logical, branch instructions, bit-related instructions, assembly language programming~~

UNIT-II

~~Interrupts, timer flag interrupt, serial port interrupt, external interrupt, interrupt control, interrupt priority interrupt destination, software generated interrupts, counter and timers, timer modes of operation, timing subroutines pure software time delay, software polled timer, pure hardware delay, look up tables~~

UNIT-III

~~Serial data communication, different modes, serial data transmission reception using time delay, by polling, interrupt driven, microcontroller applications as interfacing with keyboard and display devices A/D and D/A converters, waveform generation, frequency and pulse width measurement, stepper motor control etc.~~

UNIT-IV

~~8051 family members as 8052 with capture timer, A/D and D/A equipped family members, watch dog timer, pulse width modulation, analog comparators, PIC 16C6X/7X,16 F8XX microcontroller and architecture, industrial applications of microcontroller~~

UNIT-V

~~Software architectures Round robin, Round robin with interrupts, function queue scheduling, Real time operating system architecture –task states, scheduler, reentrancy, shared data problem, interrupt latency RTOS semaphores and problems, inter-task communication with message queues, mailboxes and pipes, Basic design using real time operating system~~

BOOKS RECOMMENDED

- [1] Mohamed. Ali Mazidi, Janice Ali Mazidi, Rolin D. McKinley, “The 8051 microcontroller & Embedded System, 2nd Edition Pearson Education, 2006
- [2] Kenneth J.Ayala, 8051 microcontroller, Architecture, Programming & Applications, Penram international publishing (India) Pvt Ltd, 1996
- [3] David E. Simon, An Embedded software Primer, 1st Pearson education, 1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR1C3: Modern Control Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3Hours	3	1	2	3	1	1	5

Course Objective: The objective is to give students a clear understanding on characteristics of digital control systems from both frequency and time domain viewpoints. Also to give students the basic knowledge of nonlinear, optimal and adaptive control systems.

Prerequisite: Knowledge of classical control methods, Z-transform, mapping of s-plane to z-plane, & MATLAB control system toolbox

COURSE CONTENTS

Unit I

Data conversion & quantization, Sampling process, mathematical analysis of sampling process, Reconstruction of sampled signal, zero order, first order hold pulse transfer function, Block diagram reduction for systems interconnected through samplers, Sampled Signal flow graphs, Stability definition, Jury's test of stability, extension of Routh-Hurwitz criterion to discrete time systems, steady state error analysis.

Unit II

Root Loci, Frequency domain analysis, Bode plots, Nyquist plots, Gain margin & phase margin, Digital implementation of analog controllers: Digital controller Design: Classical methods, digital PID's, digital lead-lags, dead-beat controller.

Unit III

State space representation of discrete time systems, Solution of state equation, Pulse transfer function from state equation, Response between sampling instant using state model, observability, controllability, useful transformation in state space, pole placement methods, controller implementations, State observers.

Unit IV

Non Linear Control Design: Introduction, General properties of linear and nonlinear systems, describing function analysis: Definition, limitations, use of describing function for stability analysis, describing function of ideal relay, relay with hysteresis, dead zone, saturation, coulomb friction and backlash, Phase Plane Analysis, phase portrait of second order nonlinear systems, limit cycle, Equilibrium finding, Stability of Nonlinear Systems: Liapunov Theorems, An Overview of Kalman Filter Theory.

Unit V

Adaptive control: Model reference control. Identification, convergence and stability. Adaptive control of linear systems via state feedback and via output feedback. Adaptive control of nonlinear systems.

Optimal Control Design : Quadratic Optimal Control and Quadratic performance index, Optimal state regulator through the matrix riccati equations, Steady State Quadratic Optimal Control, Calculus of Variations: An Overview, Optimal Control formulation using Calculus of Variations, Classical Numerical Methods for Optimal Control, Linear Quadratic Regulator (LQR) Design – I, Linear Quadratic Regulator (LQR) Design –II

Text and Reference Books:

- [1] Kuo, Digital Control System, 2/e Oxford Press, 1992.
- [2] Ogata, Discrete – Time Control System, 2/e PHI, 1995.
- [3] M Gopal, Digital Control System, TMH, 1997.
- [4] H. K. Khalil, Nonlinear Systems, 3/e, Prentice Hall, 2002.
- [5] Jasbir Arora, Introduction to Optimum Design, third edition, Elsevier. 2003
- [6] N Andreasson , A Evgrafov , M Patriksson , An Introduction to Continuous Optimization, Overseas Press, India Pvt. Ltd. 2006
- [7] D. S. Naidu, Optimal Control System, CRC Press, 2003
- [8] Arturo Locatelli, Optimal control: An introduction ,Birkhauser Verlag, 2001.
- [9] K.S. Narendra and A.M. Annaswamy, Stable Adaptive Systems, Prentice-Hall, 1989.
- [10] P. A. Ioannou and J. Sun, Robust Adaptive Control, Prentice-Hall, 1995 (available now at http://www.rcf.usc.edu/~ioannou/RobustAdaptiveBook95pdf/Robust_Adaptive_Control.pdf)

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) I – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI303 Digital Control System	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
	Duration of paper: 3 hrs			Min	50	25	25	25	125

Course objective:

To control a continuous-time (analogue) dynamical system using a digital operational element such as a digital computer. The aim is to give students a clear understanding on characteristics of digital control systems from both frequency and time domain viewpoints.

Prerequisite(s):

Knowledge of classical control methods & MATLAB control system toolbox

COURSE OF CONTENTS

Unit-I

~~Advantages & disadvantages of digital control, Elements, Block diagram, Difference equations, Sampling process and its frequency domain analysis, Ideal sampler, Sampling theorem & Nyquist frequency, Data conversion techniques, Data reconstruction, Type of Holds :Zero order & First order .~~

Unit-II

~~Definition and determination Z transform, Mapping between S plane and Z plane, Z transform theorems, The inverse Z transform, Z transform of system equations, Solution of linear difference equations using Z transform, The pulse Transfer function, Block diagram reduction for systems interconnected through samplers, Sampled Signal flow graphs.~~

Unit-III

~~Stability studies using Routh's test & Jury's test, Steady state error Analysis for discrete time system, Root locus Analysis, Correlation between time Response & frequency response, Effect of adding pole & zero to open loop transfer function.~~

Unit-IV

~~State variable representation, Time domain state and output equations for sampled data control system, State Model of a discrete time SISO system using phase variables canonical variables physical variables, State transition equation, State variable representation in the z domain, System stability, Relation between state equation & transfer function. Time response between sampling instants.~~

Unit-V

Digital design of digital controllers, Realization of digital PI, PD, PID controllers.

Books Recommended:

- [1] Kuo B.C. "Digital Control System", 2nd Edition Oxford Press, 1992.
- [2] Ogata K, "Discrete – Time Control System", 2nd Edition PHI, 1995.
- [3] Franklin G.F. and Powell J.D., *Digital Control of Dynamic Systems*, Addison-Wesley, 1980.
- [4] Gopal M. "Digital Control System", TMH, 1997.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR1G1: Advance System Design	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite:

Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit I

Introduction to digital IC design – full Custom and semi-custom design flow and comparison, Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit II

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional Unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design-Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit III

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit IV

Subsystem design principles pipelining - Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model- Technology scaling effect on interconnect and - Noise in interconnects.

Unit V

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

Text and Reference Books:

- [1] John M Yarbrough, “Digital Logic Applications and Design”, Thomson learning
- [2] Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata Mc Graw Hill Edition
- [3] Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005.
- [4] Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer, Third edition, 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) I – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI306 (Elective) Digital Instrumentation Technology Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

COURSE OF CONTENTS

UNIT –I

Transducer Fundamentals: Classification, construction, design & performance characteristics, criteria for selection, working principle of Capacitive, LVDT, Piezo-Electric transducer.

UNIT –II

Strain and &Temperature measurement: Strain Gauges and Strain Measurement, Signal conditioning of strain gauges, non- electrical and electrical method for temperature measurement, high temperature measurement.

UNIT –III

Pressure Measurement: Manometers types, Mechanical Types, Elastic Types transducers, Low Pressure measurement gauges, measurement of vacuum using McLeod gauge, thermal conductivity gauges , Ionization gauge, Pirani gauge

UNIT –IV

Flow & level measurement: Theory of fixed restriction variable head type flow meters – orifice plate, venturi tube, flow nozzle, pitot tube, Rotameter, Principle and constructional details of electromagnetic flow meter, turbine flow meter, ultrasonic flow meters, direct and indirect method for level measurement, Electrical types of level gauges using resistance, capacitance, ultrasonic sensors.

UNIT –V

Virtual Instrumentation & Instrument drives: Data Acquisition system, SCADA systems, Distributed Digital Control system, Instrument drivers- GPIB bus, Field bus.

BOOKS RECOMMENDED

- [1] Ernest O. Doebelin, *Measurement systems Application and Design*, International Student Edition, 4th Edition, McGraw Hill Book Company, 1998.
- [2] R.K.Jain, *Mechanical and Industrial Measurements*, Khanna Publishers, New Delhi, 1999.
- [3] A.K.Sawhney, *A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Raj and Sons*, New Delhi, 1999.
- [4] Liptak B.G. *Instrument Engineers Handbook (Measurement)*, Chilton Book Co., 1994.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- A				
Subject Code & Name		Instructions Hours per Week			Credits			
DIR1E2: Object Programming	Oriented	L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: The aim of the course is to give a thorough grounding in object-oriented techniques for Java, as well as to examine the major uses of Java – internet programming, design pattern, user interfaces and Networking.

Prerequisite(s): Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C.

COURSE CONTENTS

Unit I

Introduction: The History of Java, Java's Key Features, The Java Virtual Machine, The First Application. Basic Syntax - Identifiers, Comments, Keywords, The Eight Primitives, Using Objects. Expression and Arrays : Using Operators, The 'If-Else' Statements, Using 'While' Loop, Selecting with 'Switch' statement, Dealing with Primitive Casts. Using Arrays - Creating an Array, Array Initialization, Working with Arrays, Using Multi-dimensional Arrays. Classpath & JARs: The 'Classpath' in Java, Java Archives.

Unit II

Classes: Classes & Packages, The 'import' Statement, The Importance of Encapsulation, Java Constructors, Access Modifiers (private, default and public), Method Overloading. Polymorphism and Inheritance: The 'Protected' Modifier, Using 'this' and 'super', The 'final' keyword, Static Members & Methods. Interfaces & Abstract Classes, The Complete Construction Process, The Class 'Object', Nested Classes, Enums in Java.

Unit III

Basic Design Patterns:

Basic Concepts of Design Patterns, Iterators, The Pattern Concept, The OBSERVER Pattern, Layout Managers and the STRATEGY Pattern, components, Containers, and the COMPOSITE Pattern, Scroll Bars and the DECORATOR Pattern. The Java Object Model: The Java Type System, Type Inquiry, the Object Class, Shallow and Deep Copy, Serialization, Reflection

Unit IV

Exception, Collections and IO

Exceptions & Assertions: Types of Program Errors, The Exception Model, Checked and Unchecked Exceptions, Defining Custom Exceptions, Assertions. Working with Common Classes: java.lang.String, java.lang.System, java.util.Calendar. The Java Collection Framework & Generics: List Basics, Using Lists Wisely, Other Collection Classes. Java IO: Input Stream/Output Stream, JavaSerialization, Readers & Writers, Working with Files.

Unit V

Thread and Applet

Threads: The Java Thread Model, Thread Priorities, Synchronization, Messaging, Thread Class, Runnable Interface. Applet Architecture – Skeleton- Simple Applet Display Methods- HTML APPLLET tag – Passing Parameters to the Applet- AudioClip and AppletStub Interface - Delegation Event Model – Event Classes. Networking: Overview, TCP/IP Sockets, Writing Your Own Web Server.

Text Books and References:

- [1] Herbert Schildt, "Java The Complete Reference", Eighth Edition, Tata McGraw-Hill Edition India, 2011.
- [2] Cay Horstmann, "Object Oriented Design & Patterns", John Wiley & Sons, 2004.
- [3] Bruce Eckel, "Thinking in Java", 4th edition, Pearson Education, 2006.
- [4] Ramesh Vasappanavara et al, "Object-oriented Programming Using C++ and Java", First Impression, Pearson, 2011.
- [5] Cay Horstmann, "Big Java 4e for Java 7 and 8", John Wiley & Sons, 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) I – SEMESTER						
Subject Code & Name		Instructions Hours per Week			Marks					
5EI304 Programming Language for Instrumentation Systems Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total	
	3	1	2	Max	100	50	50	50	250	
				Min	50	25	25	25	125	

Course Objectives:

To understand and learn a programming language that expressly designed for use in the distributed environment of the technology along with an object-oriented programming model.

Prerequisite(s):

Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C, Smalltalk, Eiffel, Common LISP Object System (CLOS), Object Pascal, and ADA 95 etc.

COURSE OF CONTENTS

UNIT -I

Introduction to Object Oriented Programming and Java :

Object Oriented Concepts, Abstraction, Encapsulation, Information Hiding. Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods

UNIT -II

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

UNIT -III

Exception Handling, Multithreading and Introduction to Java APIs:

Exceptions: Need for exceptions, Checked V/s Unchecked exceptions, creating exceptions.

Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle. String Handling, Wrapper

classes: Arrays and Vectors

UNIT -IV

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader-writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

UNIT -V

Introduction to elementary procedures, Real & Complex vector and Matrix & Determinants and operations like:

Initialization, Duplication, Elimination, Interchanging, Rotation, Norms, Scaling, Multiplication & calculation of rank etc.

Evaluation of various polynomials like Chebyshev polynomial, Fourier polynomial etc.

Analysis of real matrix problems like: Overdetermined systems, underdetermined system, homogenous, pseudo inversion. Sparse

Real matrices, Similarity Transformation, Eigen value problems.

Numerical differentiation, Differential equations,

Introduction to special functions like: Exponential, Gamma, Error, Infinite time series, Fast Fourier transforms etc

BOOKS RECOMMENDED

- [1] Hang T. Lau, *A Numerical Library in Java for Scientist & Engineers*, Library of Congress Cataloging-in-Publication Data by Chapman & Hall/ CRC Press Company.
- [2] Cay S.Horstmann, *Core JAVA Vol-1*, Pearson Education.
- [3] Herbert Schildt, *The complete Reference*, Tata McGraw Hill
- [4] Kathy Sierra, *Bert Bates, Head First Java*, 2nd Edition, Oreilly

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2C1: Digital Image Processing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

COURSE CINTENTS

Unit I

Introduction: Background, Digital Image Representation, Elements of a Digital Image Processing System. Data Acquisition Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, machband effect, Color image fundamentals RGB, HSI models, Image sampling, Quantization, dither.

Image Transforms: Geometric and spatial transforms Introduction to the Fourier Transform, The Discrete Fourier Transform, Properties of the Two-Dimensional Fourier Transform, Other Separable Image Transforms.

Unit II

Morphological Image Processing: Dilation and Erosion, Labelling connected components, Morphological reconstruction, Gray-scale morphology, Image descriptors: Region and boundary extraction, Image representation: Chain code, boundary, skeletons, signature descriptors: shape numbers, Fourier descriptors, statistical moments, corner, Regional descriptors, PCA

Unit III

Image Enhancement and segmentation: Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Low-pass Filtering, High-pass Filtering, Generation of Spatial Masks from Frequency Domain Specifications. point, line, Edge detection, line detection using Hough transform, Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds.

Unit IV

Image Restoring: Degradations Model - Definitions, Noise Models, Diagonalization of Circulant and Block-Circulant Matrices, Circulant Matrices, Block Circulant Matrices, Effects of Diagonalization on the Degradation Model, Restoration approach, Unconstrained Restoration, Constrained Restoration, Inverse Filtering – Formulation, Removal of Blur Caused by Uniform Linear Motion, Restoration in the Spatial Domain, Geometric Transformation.

Unit V

Image Compression: Fundamentals, Types of Redundancy, Fidelity Criteria. Image Compression Models, The Source Encoder and Decoder, The Channel Encoder and Decoder. Elements of Information Theory Error-Free Compression, Variable-Length Coding, Bit-Plane Coding, Lossless Predictive Coding. Lossy Compression, Lossy Predictive Coding, Transform Coding.

Text and Reference Books:

- [1] Rafael. C. Gonzalez & Richard E.Woods.- Digital Image Processing, 2/e Pearson Education, New Delhi - 2006
- [2] W.K.Pratt.-Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006
- [3] A.K. Jain-Fundamentals of Digital Image processing- PHI, New Delhi(1995)
- [4] M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition, 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) II – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI352 Advance Digital Signal Processing	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125
Duration of paper: 3 hrs									

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s):

A basic course in Digital signal processing.

COURSE OF CONTENTS

UNIT-I Signals and Signal Processing: Characterization and Classification of signals; Sampling and Quantization; Typical signal Processing Operations; Examples Typical Signals and Systems; Typical Signal Processing applications; Why Digital Signal Processing; Building blocks of a Digital signal processor; Discrete Time Fourier Transform, Z — transform and properties.

UNIT-II

Discrete Fourier Transform: Introduction; Computation of DFT and IDFT; Periodic and symmetry properties of DFT; DTFT v/s DFT; Circular shift and Circular convolution Linear convolution using DFT; Block convolution, Overlap — add method and Overlap — save method.

UNIT-III

Fast Fourier Transform: Radix Two DIT and DIF FFT algorithm; Butterfly computation; Bit reversed mapping; In place computation; Composite — N algorithm; Prime factor algorithm.

UNIT-IV

Digital Filter Structures: Block Diagram Representation; Signal Flow Graph Representation; Equivalent structures; Basic FIR Digital Filter structures; Basic IIR filter structures; state space structure; All Pass Filter; Tunable HR Digital filters; Cascaded lattice realization of IIR and FIR Filters; Parallel all Pass Realization of IIR Transfer Function; Computational Complexity of Digital Filter structures; Tellegen theorem and its applications.(Transposition theorem and Network sensitivity formula.)

UNIT-V

Digital Filter Design: Brief Review of Analog Filter Design; Impulse Invariance method of IIR filter design; bilinear Transform Method of IIR Filter Design; Design of Digital HR notch Filters; Low Pass HR digital filter design based on Truncated Fourier Series; FIR Filter Design Based on Frequency Sampling Approach; computer aided design of digital filters. Introduction to speech and language processing.

BOOKS RECOMMENDED

- [1] Sanjit K. Mitra; *Digital Signal Processing A Computer- Based Approach*; 9th Edition, Tata McGraw Hill .
- [2] V.K.Khanna;*Digital Signal Processing; Telecommunications and Multimedia Technology* Wheeler Publishing 1999.
- [3] Richard G. Lyons Understanding *Digital Signal Processing*; .; First Indian Reprint ,Addison Wesley Longman Inc 1999.
- [4] B. Somanathan Nair “*Digital Signal Processing, Theory, analysis and Digital filter design*”; PHI New Delhi India 2005.
- [5] A. V. Oppenheim and R. W. Schaffer “*Digital Signal Processing*”

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester-B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2C2: Process Instrumentation and Industrial Control	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of paper: 3 Hours							

Course Objective: To enable students to understand the basic concept of process instrumentation applicable in various industries. It will also give in depth knowledge regarding different type of control strategies instrumentation and controller used in processing industries.

COURSE CONTENT

Unit I

Fundamentals of Process Control

Elements of process control loop, concept of process variables, set point, controlled variable, manipulated variable, load variable. Need for standardization of signals, current, voltage and pneumatic signal standards, concept of live & dead zero, Difference between converter & transmitter, Pneumatic to current converter, Current to pneumatic converter .

Unit II

Types of Control Actions:

Discontinuous:ON/OFF, Continuous: Proportional, integral, derivative, proportional-Integral, Proportional- Derivative, Proportional-Derivative-Integral

Tuning of Controller:

Quarter Amplitude Decay Ratio, Loop disturbance, optimum control, Measure of quality, stability criteria, Tuning methods: Process Reaction Curve (open loop), Ziegler Nichols (closed loop), set point tuning Vs load disturbance tuning.

Unit III

Programmable Logic Controller (PLC):

Continuous versus Discrete Process Control, ladder diagram using standard symbols, Architecture of PLC, PLC ladder diagram and instructions, PLC Programming for process applications.

Complex Control Systems:

Introduction, cascade, feed forward, Ratio Control, Anti Reset, Selector & Multivariable control scanners.

Unit IV Control Valve:

Classification of control valves based on: Valve body. Construction, type of actuation, application etc. Control valve terminology: Range ability, turndown, valve capacity, Air to open, Air to close, valve gain etc. Control valve characteristics: Inherent & installed Control valve accessories. Types of actuators. Positioners: Application/Need, Types, Effect on performance of control valves.

Unit V

Safety and Hazards:

Explosion Proof Housing, Encapsulation, Sealing, & Immersion, intrinsic safety, Concept of safety cycle.

DCS and SCADA:

DCS architecture, system elements of DCS. Definition of SCADA, Application area of SCADA, Major elements of SCADA, Advantages and disadvantages of SCADA, Comparison of SCADA, DCS, PLC and Smart Instrumentation.

Text Books and References:

- [1] Curtis Johnson, "Process Control and Instrumentation Technology", Prentice-Hall of India Seventh ed., 2005.
- [2] B. G. Liptak, "Process Control, Instrument Engineering Hand book", Chilton Book Company, Third ed., 1995
- [3] Patranabies , "Principles of Process control", Tata Mc Graw Hill Pub, 2006
- [4] P. Harriott , "Process control", McGraw-Hill: New York, 1964
- [5] Stuart A. Boyer, "SCADA-Supervisory Control and Data Acquisition System " , ISA publication 3rd Edition)
- [6] Dobrivoje Popovic and Vijay Bhatkar, "Distributed Computer Control for Industrial ",Marcel Dekker Inc.,1990

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) II – SEMESTER						
Subject Code & Name		Instructions Hours per Week			Marks					
5EI354 Process Instrumentation System Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total	
	3	1	2	Max	100	50	50	50	250	
				Min	50	25	25	25	125	

Course Objectives

To develop fundamentals of process control characteristics and various process schemes. To formulate approaches for the process/modification, control structure design and algorithm tuning to achieve good performance over a range of operating conditions.

Prerequisite(s):

Basic principles of Sensors and Transducers

COURSE CONTENTS

Unit 1: Process Characteristics & Automatic Controllers

~~Process Variables, Process Degree of Freedom, Characteristics of Physical System, Control System parameters, Continuous & discontinuous controller modes, Composite control mode, Analog & Digital controllers, Design of various kinds of controllers, Process Loop timing.~~

Unit-II: Hydraulic & Pneumatic Control system.

~~Concepts of resistance, capacitance, and inductors in liquid and pressure systems, Hydraulic and Pneumatic Components, Various kinds of controller & their characteristics, Thermal systems, Flow, pressure and level Control~~

Unit III: Complex Control Systems.

~~Introduction, cascade, feed forward, Ratio Control, Anti Reset, Selector & Multivariable control scanners, Final Control elements, Adaptor & Non linear Control System, Self Adaptive Systems, Predictive Approach~~

Unit IV: Programmable Logic Controllers

~~Discrete state Process Control, Discrete State Variable, Event Sequence Description, Ladder Diagram, Programmable controller, Relay Sequences, Programming, Advanced Features.~~

Unit V: Instrumentation in processing industry.

~~Instrumentation as applied to petro-chemical industry and thermal power plants, Overall plant description, Control of batch reactor, distillation columns, Furnace control, steam temperature control~~

Books Recommended:

- [1]. D.P. Eckman “Automatic Process control”
- [2] Patranabies “Principles of Process control”
- [3] F.G. Shinsky. “Process control System”
- [4] Curtis Johnson “Process control Instrumentation Technology”
- [5] B.G. Liptak.”Hand Book of Process control”
- [6] Otter, “Programmable logic Controllers”, Prentice Hall, 1988

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2C3: System Design using Verilog	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives:

To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog. Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s):

Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

Unit I

Overview of Digital Design with Verilog HDL: Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts: Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts: Lexical conventions, data types, system tasks, compiler directives.

Unit II

Modules and Ports: Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling: Modeling using basic Verilog gate primitives, description of andlor and buflnotttype gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling: Continuous assignments, delay specification, expressions, operators, operands, operator types.

Unit III

Behavioral Modeling: Structured procedures, initial and always, blocking and nonblocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation.

Useful Modeling Techniques: Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

Unit IV

Timing and Delays: Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling: MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

Unit-V

Logic Synthesis with Verilog HDL: Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

Text Books and References:

- [1] Samir Palnitkar , “Verilog HDL-A guige to Digital Design and Synthesis “ 2nd Edition, Pearson , 2006.
- [2] J. Bhaskar, “A Verilog HDL Primer”, B.S Publications,
- [3] Douglas J. Smith, “Hdl Chip Design : A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog”.Doone Pubns ,1998.
- [4] Blaine Readler , “Verilog by Example: A Concise Introduction for FPGA Design”, Full Arc Press, 2011

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) II – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI353 VHDL for Instrumentation Systems	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

To enable the students to translate a functional system description into appropriate digital blocks coded in VHDL .Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s):

Digital Design, Microprocessor architecture, C++ language.

COURSE OF CONTENTS

UNIT – I Introduction to VLSI

History of IC Design, IC Technology, Moore’s Law, IC Design Constraints, Feature Size, VLSI Family, Programmable Logic Devices, Designing with Programmable Logic Design Entry, Simulation, Synthesis, Implementation, Device Programming, EDA Tools, IP Cores, Gjeski’s Y Chart.

UNIT – II

FPGA and CPLD

ROMs, Logic array (PLA), Programmable array logic, GAL, bipolar PLA, NMOS PLA, PAL 14L4, Xilinx logic cell array (LCA) I/O Block Programmable interconnect Xilinx 3000 series and 4000 series FPGAs. Altera CPLDs, altera FLEX 10K series PLDs.

UNIT – III

Introduction to VHDL

Digital system design process , Hardware simulation , Levels of abstraction , VHDL requirements , Elements of VHDL Top down design, VHDL operators ,Timing ,Concurrency ,Objects and classes , Signal assignments ,Concurrent and sequential assignments.

UNIT – IV

Modeling Techniques and Advance Topics

Entity Declaration, Architecture Body, Process statement, Loop control statements, Multiple Processes, Delay Models, Signal Drivers, Block statements, Component declaration and Instantiation, Concurrent Assignment statements, Generics and Configuration, Subprogram, Overloading, Packages and Libraries, Design Libraries, Generate statements, Attributes, Hardware Modeling Examples: Modeling of digital modulator and demodulators, digital filters, WAP protocols, network security modules, wireless signal reception modules etc.

UNIT – V

Design for Synthesis

Language directed view of synthesis, Inference from CSA statements, Inference from within Process, Inference using Signals v/s variables, Latch v/s Flip Flop Inference, Wait statements, Synthesis Hints.

BOOKS RECOMMENDED

- [1] P.K. Chan & S. Mourad, “*Digital Design sing Field Programmable Gate Array*” 1st Edition, Prentice Hall, 1994.
- [2] J. V. Old Field & R.C. Dorf, “*Field Programmable Gate Array*”, John Wiley, 1995.
- [3] M. Bolton, “*Digital System Design with Programmable Logic*”, Addison Wesley, 1990.
- [4] Sudhakar Yalamanchili, “*Introductory VHDL- From Simulation to Synthesis*”, 3rd Indian Reprint., Pearson Education,
- [5] Douglas Perry, “*VHDL*”, 3rd Edition, McGraw Hill 2001.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2G3:Modelling and Simulation	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objectives:

To give exposure of stochastic processes and to show their importance in engineering education and research. To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give hands on experience in MATLAB to be used as a simulation tool for the stochastic processes. To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of probability theory.

COURSE CONTENTS

Unit I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

Unit II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernouli pmf, Bionomial pmf, Geometric pmf, Poisson pmf, ContinuousRandom Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable.

Unit III

Markov Chains- Classification of stochastic process, Introductionto Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, HigherTransition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

Unit IV

Markov Processes -Introduction to Continues Time Markov Chains, Birthand Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

Unit V

Simulation- Simulation of Queues, Statistical Inference and FewExamples on Simulation

Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

Text and Reference Books:

- [1] S.M. Ross, "Introduction to Probability Models, 9th Edition, Elsevier Publication", 2007.
- [2] K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition , A Wiley-Interscience Publication.
- [3] Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition, Tata McGraw-Hill Publication.
- [4] A Papoulis, S.V Pillai, "Probability Random Variables and Stochastic Processes", 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year Electronics(Sp. Digital Instrumentation) II – SEMESTER						
Subject Code & Name	Instructions Hours per Week			Marks					
5EI351 Modeling Simulation and Evaluation Techniques Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Course Objectives:

- To give exposure of stochastic processes and to show their importance in engineering education and research
- To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results.
- To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes
- To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of Probability Theory.

COURSE OF CONTENTS

UNIT –I

Introduction to Probability Theory - Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables - Definition, Discrete and Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Distributions for Discrete and Continuous Random Variables, Geometric Distribution, Poisson Distribution, Uniform Distribution, Exponential Distribution, Normal Distribution, Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable, Moment Generating Function.

UNIT –III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, and Chapman Kol Mogorov Equation, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes and Queuing Theory-Introduction to Continuous time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Non Birth Death Processes, Exponential Distribution & Poisson Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/G/1 Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation.

BOOKS RECOMMENDED

- [1] K.S.Trivedi, “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, 2nd Edition , Wiley-Interscience Publication. A
- [2] Averill M. Law, W. David Kelton, “Simulation Modeling and Analysis”, 3rd Edition, Tata McGraw-Hill Publication.
- [3] S.M. Ross, “Introduction to Probability Models, 9th Edition, Elsevier Publication”, 2007.
- [4] A Papoulis, S.V Pillai, “Probability Random Variables and Stochastic Processes”, 4th Edition, TMH Publication, 2002

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Instrumentation) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DIR2E1: Analog and Digital VLSI Circuit Design	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT II

MOS Transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on delay and power dissipation.

UNIT IV

CMOS Circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation

Text and Reference Books:

- [1] Sung-mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuit analysis and Design, 3rd Edition, Tata McGraw-Hill.
- [2] Neil H.E. Weste and Kamran Esharhian, Principal of CMOS VLSI design, 2nd Edition, PHI, (anded), AW/Pearson, 2001.
- [3] CMOS mixed-signal circuit design by R. Jacob Baker Wiley India, IEEE press, reprint 2008.
- [4] Design of analog CMOS integrated circuits by Behad Razavi McGraw-Hill, 2003.

List of Experiment:

Note : Use the BSIM3v3 (T-SPICE Level 49) model to characterize a 0.18 μ m CMOS process (TSMC).

1. Determine the threshold voltage V_{TH} for the NMOS and PMOS devices (for $V_{BS}=0$, $L=0.18\mu m$ and $W=1\mu m$), by extrapolating from the I_D - V_{GS} curve at low V_{DS} . Explain your circuit setup. How does this result compare to values reported in the model file? Also, determine the body-effect parameter.
2. Determine the subthreshold slope factor S for the NMOS and PMOS devices (at $V_{DS} = 1.8V$, room temperature). Determine the leakage currents at $V_{GS} = 0$ V. Repeat it at a lower temperature $T=77k$.
3. Determine the effects of channel length L on the threshold voltage V_{Th} between $0.18\mu m$ to $2.0\mu m$. Draw V_{Th} of the NMOS and PMOS as a function of L (for $V_{DS}=1.8$ and $1.2V$).
4. Determine the effects of drain-source voltage V_{DS} , on the threshold voltage V_{Th} between and $1.8V$. Draw V_{Th} as a function of V_{DS} (for $L=0.18\mu m$). What is the measured DIBL factor?

5. With the given CMOS inverter Circuit calculate and estimate the static Characteristics Determine the VTC of CMOS Inverter
Obtain the NM_H , NM_L , and V_M for the inverter
Dynamic Characteristics
Measure the t_{pHL} , t_{pLH} , t_P , t_r , t_f

Power Consumption with varying load capacitances from 100fF to 500fF. And compute the power Delay Product (PDP) for the 0.18 Micron technologies.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Instrumentation) II – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5EI359 (Elective) VLSI Technology	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	50	25	-	-	75

Course Objectives:

This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisite(s):

Knowledge of semiconductor devices is required.

COURSE OF CONTENTS

UNIT-I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process.

Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT-II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current—Voltage Characteristics. Transconductance, Drain conduction. Aspect ration, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT-III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT-IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

UNIT-V

Layout: Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter Circuit, circuit Extraction from Layout. Limitations of CMOS in NANO-scale circuit design.

BOOKS RECOMMENDED

- [1] Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
- [2] R. Jacob Baker, Harry W. Li and David E. Boyce, *CMOS Circuit design, layout and*

- Simulation*, Series Edition, PHI, IEEE press,
- [3] Yuan Taur and Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Special Edition, Cambridge university press, 1998
 - [4] Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, 2nd Edition, PHI.

Academic Year: July-2015 to June-2016
 Programme: M.E (FT) I
 Branch : Mechanical Engineering (Design & Thermal Engineering)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	SDT603	Tribology	DTR1C1	Tribology	5%
2	SDT602	Design of Internal Combustion Engine Systems	DTR1C2	Design of Internal Combustion Engine Systems	5%
3	SDT604	Advanced Machine Design	DTR1C3	Advanced Machine Design	0%
4			ASR1S1	Soft Skills -1	100%
5	SDT601	Advanced Thermodynamics	DTR1G1	Advanced Thermodynamics	5%
6	SDT609	Non Conventional Energy Systems	DTR1G2	Non Conventional Energy Systems	5%
7			DTR1G3	Management Information System	0%
8			DTR1G4	Finite Element Analysis	5%
9	SDT606	Advanced Mechanics of Solids	DTR1E1	Advanced Mechanics of Solids	5%
10	SDT605	Fatigue Creep and Fracture	DTR1E2	Fatigue Creep and Fracture	0%
11	SDT607	Mechanism and Robot Kinematics	DTR1E3	Mechanism and Robot Kinematics	0%
12	SDT608	Thermal Systems : Simulation and Design	DTR1E4	Thermal Systems : Simulation and Design	5%
13	SDT653	Machinery Fault Diagnosis and Signal Processing	DTR2C1	Machinery Fault Diagnosis and Signal Processing	5%
14	SDT651	Design of Heat Transfer Equipment	DTR2C2	Advanced Refrigeration and Air Conditioning	100%
15			DTR2C3	Computer Aided Modeling and Simulation	100%
16	SDT656	Computer Aided Modeling and Simulation	ASR2S2	Soft Skills -2	100%
17			DTR2G1	Advanced Heat Transfer	100%
18			DTR2G2	Rapid Prototyping	100%
19			DTR2G3	Co-generation and Waste Heat Recovery	0%
20	SDT659	Co-generation and Waste Heat Recovery	DTR2G4	Mechatronics in Manufacturing Systems	5%
21	SDT654	Machine Vibrations Analysis	DTR2E1	Machine Vibrations Analysis	5%
22			DTR2E2	Experimental Stress Analysis	5%
23	SDT657	Experimental Stress Analysis	DTR2E3	Applied Elasticity and Plasticity	5%
24	SDT655	Applied Elasticity and Plasticity	DTR2E4	Automotive Systems: Analysis and Design	5%
25	SDT658	Automotive Systems: Analysis and Design			28%
Average % change in BE program = Total average / 2 =					14.00%

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Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT603 TRIBOLOGY	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	50	25	25	25	125

COURSE CONTENTS

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are Material Science and Machine Design.

UNIT- 1

Fundamentals of Tribology

Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques.

UNIT- 2

Friction

Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods.

UNIT- 3

Wear

Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-4

Lubrication

Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizes, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring.

UNIT- 5

Design for Tribological Elements

An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication, Design of hydrodynamically loaded journal bearing, externally pressurized bearing, rolling element bearing, performance analysis of bearing.

BOOKS RECOMMENDED:

- [1] Moore F Desmond , *Principals and application of Tribology*, ,Pergamon press,1975.
- [2] Sahoo P., *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005.
- [3] Lansdown A. R., *Lubrication, A practical Guide to Lubricant selection*, Pergamon Press, 1982.
- [4] Majumdar B.C., *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi, 1999.

LABORATORY EXPERIMENTS:

1. Performance analysis of Journal Bearings.
2. Experimental analysis of Lubricants.
3. Experimental analysis of Friction on different material.
4. Study of method for Wear Debris analysis.
5. Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Semester A Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR1C1	L	T	P	L	T	P	Total
Tribology	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of friction, wear and lubrication. The subject is useful in understanding the nature of surfaces of engineering materials. The Pre requisites are material science and machine design.

UNIT- 1

Fundamentals of Tribology:

Introduction to tribology and its historical background, Industrial importance, factors influencing Tribological phenomenon. Engineering surfaces- surface characterization, computation of surface parameters. Surface measurement techniques.

UNIT- 2

Friction:

Genesis of friction, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction, friction of elastomers, friction of various materials, friction measurement methods.

UNIT- 3

Wear:

Introduction, types of wear, wear mechanism, minor forms of wear, wear debris analysis, wear testing method, wear of metals, ceramics, polymers, system approach for wear reduction.

UNIT-4

Lubrication:

Basic principal of lubrication, choice of lubricant type, selection of lubrication oils, oil changing and oil conservation, oil feed system, Greece and anti seizes, gas bearing, lubricating sealing, lubricating testing and specifications, lubrication monitoring.

UNIT- 5

Design for Tribological Elements:

An overview of engineering materials having potential for tribological application, characterization and evaluation of ferrous materials for tribological requirements/application, selection of ferrous materials for rolling element bearings, Boundary lubrication, Hydrodynamic lubrication, elastohydrodynamic lubrication, Design of hydrodynamically loaded journal bearing, externally pressurized bearing, rolling element bearing, performance analysis of bearing.

BOOKS RECOMMENDED

- [1] Moore F Desmond ,*Principals and application of Tribology*, ,Pergamon press,1975
- [2] Sahoo Prashant *Engineering Tribology*, Prentice-Hall of India, New Delhi, 2005
- [3] Lansdown A R ,*Lubrication, A practical Guide to Lubricant selection*, Pergamon Press1982
- [4] Majumdar BC, *Introduction to Tribology of Bearings*, Wheeler Publishing, New Delhi,1999.

LABORATORY EXPERIMENTS:

1. Performance analysis of Journal Bearings.
2. Experimental analysis of Lubricants.
3. Experimental analysis of Friction on different material.
4. Study of method for Wear Debris analysis.
5. Design analysis for Hydrodynamic Journal Bearing and rolling contact bearing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E. I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT602 DESIGN OF IC ENGINES COMPONENTS & SUB SYSTEMS	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	50	25	25	25	125

Objectives & Pre requisites: To impart the basics of Internal Combustion Engine design and theory. Fundamentals of thermodynamics, Combustion process, Theory of Internal combustion Engines.

COURSE CONTENTS

UNIT-1

Theory of IC Engines

Introduction to different types of IC engine systems. Engine design and operating parameters. ~~Power plant cycles for stationary and aerospace applications, component behaviours, analysis of ramjet, turbojet and turbo propeller. Inlets and nozzles. Stage velocity diagrams, reaction stages, losses and coefficients, blade design principles, testing and performance characteristics.~~

UNIT-2

Fuels and Combustion

Fuels for engines and their characteristics. Fuel-air mixing, gas exchange, Ignition and combustion. Stoichiometry Relations, Theoretical Air Required for Complete Combustion, Calculation of Minimum Amount of Air Required for a Fuel of known Composition, Calculation of Dry Flue Gases if Fuel Composition is Known, Calculation of the composition of Fuel & Excess Air Supplied, from Exhaust Gas Analysis, Dew Point of Products, Flue Gas Analysis (O₂, CO₂, CO, NO_x, SO_x) Ignition, Concept of Ignition, Auto Ignition, Ignition Temperature.

UNIT-3

IC Engines Sub System Design

Fuel injection systems.. ~~Combustion chamber designs for spark ignition and compression ignition engines.~~ Engine cooling and cooling system design. Engine lubrication system. Design Of Two-Stroke Engines Arrangement and sizing of ports, piston assembly, intake and exhaust system, scavenging, application to automotive gasoline and marine diesel engines. Testing and performance of IC engines.

UNIT-4

Advance IC Engines Subsystems

Emission control and electronic management systems. Design of Supercharged engines, Advances in engine design, Modern trends in IC Engines. ~~Engines for special applications—Mining-Defence, Off highway Tractor, Bulldozer etc. Submarines, Race car engine systems, Flexible fueled systems.~~

UNIT- 5

Thermal System Optimisation

~~Objective function formulation, Constraint equations, Mathematical formulation, Calculus method, Dynamic programming, Geometric programming, Linear programming methods, solution procedures. Steady state simulation, Laplace transformation, Feedback control loops, Stability analysis, Non-linearities.~~

BOOKS RECOMMENDED:

- [1] V. Ganesan, *Internal Combustion Engines*, TataMcGraw-hill, 1990
- ~~[2] Gordon P.Blair, *Basic design of Two-stroke Engines*, S.A.E., 1992.~~
- ~~[3] A.Kolchin, *Design of Automotive Engines*, Mir Publishers, Moscow, 1984.~~
- ~~[4] Kapoor J.N., *Mathematical Modelling*, Wiley Eastern Ltd., New York, 1989.~~
- ~~[5] Winterbone D.E., *Design Techniques for Engine Manifolds, Wave action methods for I.C Engines*, Professional Engineering Publishing Ltd., UK, 2000.~~

LABORATORY EXPERIMENTS:

1. Study of various IC Engine Components.
- ~~2. Performance test on spark ignition engine using Alternate fuels such as ethanol and LPG.~~
3. Emission measurement in Spark Ignition and Compression Ignition Engines.
- ~~4. Heat Transfer through fins.~~

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTR1C2 Design of Internal Combustion Engine Systems	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives: To impart the knowledge of internal combustion engine from systems design perspective.

Pre requisites: Fundamentals of thermodynamics, Combustion process, Theory of Internal combustion Engines.

COURSE CONTENT

UNIT-1

Genesis

Evolution: Limitation of Steam Engines, Hot Air Engine, Internal Combustion Engines, Atmospheric Engines, Lenoir Engines, Otto-Langen Engine; Engine Cycles; Flow chart of typical Internal Combustion engine processes; Classification; Configurations; Operational and performance parameters; Fuels for engines: composition, characteristics.

UNIT-2

Induction and Exhaustion Systems

Gas exchange; Intake system: Air-filter, Carburetor, Injectors: throttle body, port, direct injection; Diesel Injection: Low and High pressure Common Rail Systems, Jerk pump systems, Electronically controlled; Manifolds; Superchargers and turbochargers; Exhaust Systems; Exhaust manifold, Exhaust Pipe, Catalytic Converter, Muffler; Valves Flows: Flow Patterns, Discharge Coefficient, Performance, Timing and its Effects; Scavenging: Performance parameters; Volumetric Efficiency.

UNIT-3

In-cylinder flows and Combustion Thermochemistry

In-cylinder flows: Measurement; Swirl: Induction Swirl, Swirl Coefficient, Swirl Ratio; Swish; Tumble; Squish; Prechamber flows; Stoichiometry Relations: Air required for Complete Combustion based on Fuels, Incomplete Combustion, Calculation of Dry Flue Gases for known fuel composition, Estimating Fuel Composition and Excess Air quantity from Exhaust Gas Analysis, Flue Gas Analysis (O₂, CO₂, CO, NO_x, SO_x); Combustion Terminology: Adiabatic Flame temperature, Combustion Rates, Equilibrium Coefficient, First Law applied to Chemical Reactions Combustion Efficiency.

UNIT-4

IC Engines Sub Systems

Starting and Charging systems; Ignition Systems; Engine Heat transfer and Cooling systems; Engine friction and lubrication systems; Mechanisms for system operations.

UNIT-5

Pollutant Formation and Control

Emission Formation in SI Engines: Constituents, Formation Mechanisms: Hydrocarbon, Carbon Monoxide, Oxides of Nitrogen, Carbon dioxide, Aldehydes; Control Techniques; Fuel Injection Technologies, Heated Oxygen Sensors, Emission formation in CI Engines: Constituents, formation Mechanisms: Carbon Monoxide, Unburned Hydrocarbons, Oxides of Nitrogen, Compounds of Sulphur, Particulate Matter, Control Techniques: Fuel Injection Technology, Electronically Controlled Distribution, Electronic Unit injector System, After Treatment Devices.

Text Books:

- [1] Engineering Fundamentals of internal Combustion Engines, Willard W. Pulkrabek, Printice Hall New Jersey.
- [2] Internal Combustion Engine Fundamentals, John B Heywood, McGraw-Hill Book Company, New York, 1988.

Reference Books

- [3] Internal Combustion Engines Applied Thermosciences, Colin R. Ferguson and Allan T. Kirkpatrick, John Wiley & Sons, 2e, 2004
- [4] Internal Combustion Engines, V. Ganesan, Tata McGraw-Hill, New-Delhi, 1990
- [5] An Introduction to Combustion: Concept and Applications, Stephen R. Turns, McGraw-Hill Education (India), New-Delhi, 2011

List of Experiments

1. Study of various IC engine Components and Sub-systems.
2. Study of Induction and Exhaustion Systems
3. Study of Ignition Systems, Cooling systems, lubrication systems for IC engine systems
4. Simulation and Modeling of Spark Ignition engines
5. Simulation and Modeling of Compression Ignition engines
6. Emission measurement in Spark Ignition and Compression Ignition Engines.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)						
Subject Code & Name		Instructions Hours per Week			Marks					
5DT604 ADVANCED MACHINE DESIGN	L	T	P		TH	CW	SW	PR	Total	
	3	1	2	Max	100	50	50	50	250	
	Duration of Theory Paper: 3 Hours			Min	50	25	25	25	125	

Objectives & Pre requisites: The objective of the subject is to deal with failure analysis and advanced areas of design of machine elements based on reliability, fatigue, creep. Also deals with the fracture mechanics approach to design. Pre requisites are Material science, Machine Design I and Machine Design II.

COURSE CONTENTS

UNIT-1

Introduction to Advanced Mechanical Engineering Design

Review of materials and processes for machine elements. Case studies of mechanical engineering design failures. Review of static strength failure analysis – theories of failure.

UNIT -2

Reliability and Optimum based Design

Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability ,System concepts in Reliability engineering. Failure distributions, Statistical analysis of failure data, Weibull analysis, dimensioning.

UNIT -3

Design for Dynamic Loading

High cycle and low cycle fatigue, Fatigue strength. Design of Mechanical Equipment Elements. Exercises of fatigue design of shafting and gears. Exercises of surface fatigue design of rolling contact bearings including linear bearings.

UNIT -4

Design for Creep

Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

UNIT -5

Fracture mechanics

Introduction: Fracture mechanics approach to design, the energy criterion, the stress intensity approach, effect of material properties on fracture, dimensional analysis in fracture mechanics.

Fundamental concepts: Stress concentration effect of flaws, the Griffith energy balance, the energy release rate, instability and the R curve, stress analysis of cracks, K as a failure criterion. Fracture toughness testing of metals

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003.
- [2] Dieter G.E., *Engineering Design*, McGraw-Hill 2000.
- [3] Spotts M.F., Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e, 2006.
- [4] Shariff A., *Design of Machine, Elements*, Dhanpat Rai Publications(P) Ltd., 3e, 1995.
- [5] Mubeen., *Machine Design*, Khanna Publications(P) Ltd., 2004.

LABORATORY EXPERIMENTS:

1. Problem based on theories of failures.
2. Problem based on Reliability Criterion.
3. Problem based on Optimum Criterion.
4. Problem on Design of parts subjected to Fatigue Loading.
5. Problem on Design of parts subjected to Creep.
6. Experimental analysis of fracture mechanism for different materials.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
<i>DTRIC3</i> Advanced Machine Design	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objectives: The objective of the subject is to deal with failure analysis and advanced areas of design of machine elements based on reliability, fatigue, creep. Also deals with the fracture mechanics approach to design.

Prerequisite(s): Pre requisites are Material science, Machine Design I and Machine Design II.

COURSE OF CONTENTS

Unit-I

Introduction to Advanced Mechanical Engineering Design:

Review of materials and processes for machine elements. Case studies of mechanical engineering design failures. Review of static strength failure analysis – theories of failure.

Unit-II

Reliability and Optimum based Design :

Introduction to optimum design, analysis of simple machine members based on optimum design. Fundamentals of reliability ,System concepts in Reliability engineering. Failure distributions,Statistical analysis of failure data, Weibull analysis, dimensioning.

Unit-III

Design for Dynamic Loading:

High cycle and low cycle fatigue, Fatigue strength. Design of Mechanical Equipment Elements. Exercises of fatigue design of shafting and gears. Exercises of surface fatigue design of rolling contact bearings including linear bearings.

Unit-IV

Design for Creep:

Introduction to Design for creep. Combined creep and fatigue failure prevention. Design for low temperature (Brittle failure). Design for corrosion, wear, hydrogen embrittlement, fretting fatigue and other combined modes of mechanical failure.

Unit-V

Fracture mechanics:

Introduction: Fracture mechanics approach to design, the energy criterion, the stress intensity approach, effect of material properties on fracture, dimensional analysis in fracture mechanics.

Fundamental concepts: Stress concentration effect of flaws, the Griffith energy balance, the energy release rate, instability and the R curve, stress analysis of cracks, K as a failure criterion. Fracture toughness testing of metals

Note: Only Mechanical Engineer's Handbook, Data-books and certified notes are allowed in the examination hall.

Text Books:

1. Shingley J.E., *Mechanical Engineering Design*, McGraw-Hill 2003
2. Dieter G.E., *Engineering Design*, McGraw-Hill 2000.
3. Mubeen., *Machine Design*, , Khanna Publications(P) Ltd.,2004

Reference Books:

- [1] Spotts M.F.,Shoup T.E., Hrnberger L.E., *Design of Machine Elements*, Pearson Education ,8e,2006
- [2] Shariff A.,*Design of Machine Elements*,Dhanpat Rai Publications(P) Ltd.,3e,1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ASR1S1: Soft Skill-1	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [3] Kumar Mahi. Stress Coping Skills Ebook, Health & Medicine, Technology, 2009.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT601 ADVANCED THERMODYNAMICS	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives: The basic objective of the subject is to deal fundamentals of Thermodynamics, Compressible Fluid Flow properties, Thermodynamics relations & Exergy.

Prerequisites: Basic Engineering Thermodynamics.

COURSE CONTENTS

UNIT-1

Mass and Energy Analysis of Control Volume

Control Volume, Steady Flow Process, Mass Balance and Energy Balance in a Simple Steady Flow Processes, Variable Flow Processes, Comparison of SFEE with Euler and Bernoulli Equations, ~~Discharging and Charging a Tank.~~

UNIT-2

Compressible Fluid Flow

Velocity of Pressure Pulse, Stagnation Properties, One Dimensional Steady Isentropic flow, Critical Properties, Normal Shocks, Adiabatic Flow with Friction, Diabatic Flow without Friction.

UNIT-3

Thermodynamic Property Relations

Mathematic Theorems, Maxwell's Relations, TdS Equations, Heat Capacities, Joule Kelvin Effects, Clausius Clapeyron Equation, Gibb's Phase Rule, ~~Local Equilibrium Conditions,~~

UNIT-4

Exergy

Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency, Exergy Change of System, ~~Exergy Transfer, Exergy Principles.~~

UNIT-5

Gas Turbine Power Plants

General Aspects, Simple Gas Turbine Plant, Constant Pressure Combustion Gas Turbines, Constant Volumes Gas Turbines, Combination Gas Turbine Cycles, Gas Turbine Power Lay out, Relative Thermal Efficiencies of Different Cycles.

BOOKS RECOMMENDED:

- [1] Y.A Cengel, *Thermodynamics-An Engineering Approach*, McGraw Hill Companies, 2006.
- [2] P.K Nag, *Engineering Thermodynamics*, The McGraw Hill Companies, Third Edition.
- [3] G.E Myers, *Engineering Thermodynamics*, Prentice Hall, Third Edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1G1	L	T	P	L	T	P	Total
Advanced Thermodynamics	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objective: The basic objective of the subject is to deal fundamentals of Thermodynamics, Compressible Fluid Flow properties, Thermodynamics relations & Exergy.

Prerequisite: Basic Engineering Thermodynamics.

COURSE CONTENT

UNIT 1

Mass And Energy Analysis Of Control Volume

Control Volume, Steady Flow Process, Mass Balance and Energy Balance in a Simple Steady Flow Processes, Variable Flow Processes, Comparison of SFEE with Euler and Bernoulli Equations, **Examples of a Variable Flow Problems. Illustrative Problems.**

UNIT 2

Thermodynamic Property Relations

Mathematic Theorems, Maxwell's Relations, TdS Equations, Heat Capacities, Joule Kelvin Effects, Clausius Clapeyron Equation, Gibb's Phase Rule, **General Thermodynamic considerations on an Equation of State. Illustrative Problems**

UNIT 3

Exergy

Work Potential of Energy, Reversible work and Irreversibility, Second Law Efficiency, Exergy Change of System, Exergy of a Closed System, Exergy of a Steady Flow System, Maximum Work Obtainable Conditions, **Illustrative Problems**

UNIT 4

Vapour Power Cycles

General Aspects, Simple Steam Power Cycle, Rankine Cycle, Reheat Cycle, Ideal Regenerative Cycle, Feedwater Heaters, Exergy Analysis of Vapour Power Cycles, **Illustrative Problems**

UNIT 5

Finite Time Thermodynamics

General Aspects, Application of principles on Reversible and Irreversible Cycles, Maximum Power Output conditions, Effect of Cycle Irreversibility Parameter on the performance of the Cycles, Performance of Engines working under Maximum Power and Maximum Power Density conditions, Entropy Generation Minimization, Concepts of Virtual Entropy, **Illustrative Problems.**

Books Recommended:

- [1.] Y.A Cengel, *Thermodynamics-An Engineering Approach*, McGraw Hill Companies, 2006.
- [2.] P.K Nag, *Engineering Thermodynamics*, The McGraw Hill Companies, Third Edition
- [3.] G.E Myers, *Engineering Thermodynamics*, Prentice Hall, Third Edition.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instruction Hours per Week			Marks					
5DT609 NON CONVENTIONAL ENERGY SYSTEMS	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives: The objective of the subject to acquaint the students the renewable energy technological systems, its principle ,working, system design and analysis of present systems, to analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.

Pre requisites: Thermal Engineering, Heat and Mass transfer, fluid mechanics, steam engineering, combustion technology.

COURSE CONTENT

UNIT-1

Solar Energy

Solar radiation its measurements and prediction - solar thermal flat plate collectors concentrating collectors – applications - heating, cooling, desalination, power generation, drying, cooking etc - principle of photovoltaic conversion of solar energy, types of solar cells and fabrication. Photovoltaic applications: battery charger, domestic lighting, street lighting, and water pumping, power generation schemes. Design and Thermal analysis.

UNIT-2

Wind Energy

Atmospheric circulations – classification - factors influencing wind - wind shear – turbulence - wind speed monitoring - Betz limit - Aerodynamics of wind turbine rotor- site selection - wind resource assessment - wind energy conversion devices - classification, characteristics, and applications. Hybrid systems - safety and environmental aspects.

UNIT-3

Bio-Energy

Biomass resources and their classification - chemical constituents and physicochemical characteristics of biomass - Biomass conversion processes - Thermo chemical conversion: direct combustion, gasification, pyrolysis and liquefaction - biochemical conversion: anaerobic digestion, alcohol production from biomass - chemical conversion process: hydrolysis and hydrogenation. Biogas - generation - types of biogas Plants- applications Design of bio gas digesters, landfill gas systems and gasifiers.

UNIT-4

Hydrogen and Fuel Cells

Thermodynamics and electrochemical principles - basic design, types, and applications - production methods - Bio photolysis: Hydrogen generation from algae biological pathways - Storage gaseous, cryogenic and metal hydride and transportation. Fuel cell – performance characteristics ,principle of working- various types - construction and applications.

UNIT-5

Other Types of Energy

Ocean energy resources - principles of ocean thermal energy conversion systems - ocean thermal power plants - principles of ocean wave energy conversion and tidal energy conversion – hydropower – site selection, construction, environmental issues - geothermal energy - types of geothermal energy sites, site selection, and geothermal power plants, MHD, Thermal analysis

Note: HMT Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Sukhatme, S.P., *Solar Energy*, Tata McGraw Hill, 1984.
- [2] Twidell, J.W. and Weir, A., *Renewable Energy Sources*, EFN Spon Ltd., 1986.
- [3] Kreith, F and Kreider, J. F., *Principles of Solar Engineering*, McGraw-Hill, 1978.
- [4] Duffie and Beckman, *Solar Thermal Engineering Process*, John Wiley @Sons, New York.
- [5] Veziroglu, T.N., *Alternative Energy Sources*, Vol 5 and 6, McGraw-Hill, 1990.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Part Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1G2	L	T	P	L	T	P	Total
Non Conventional Energy Systems	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objective: The objective of the subject to acquaint the students the renewable energy technological systems, its principle ,working, system design and analysis of present systems, to analysis the environmental and cost economics of using renewable energy sources compared to fossil fuels.

Pre requisites: Thermal Engineering, Heat and Mass transfer, fluid mechanics, steam engineering, combustion technology.

COURSE CONTENT

UNIT-1

Solar Energy

Solar radiation its measurements and prediction - solar thermal flat plate collectors concentrating collectors – applications - heating, cooling, desalination, power generation, drying, cooking etc - principle of photovoltaic conversion of solar energy, types of solar cells and fabrication. Photovoltaic applications: battery charger, domestic lighting, street lighting, and water pumping, power generation schemes. Design and Thermal analysis.

UNIT-2

Wind Energy

Atmospheric circulations – classification - factors influencing wind - wind shear – turbulence - wind speed monitoring - Betz limit - Aerodynamics of wind turbine rotor- site selection - wind resource assessment - wind energy conversion devices - classification, characteristics, and applications. Hybrid systems - safety and environmental aspects.

UNIT-3

Bio-Energy

Biomass resources and their classification - chemical constituents and physicochemical characteristics of biomass - Biomass conversion processes - Thermo chemical conversion: direct combustion, gasification, pyrolysis and liquefaction - biochemical conversion: anaerobic digestion, alcohol production from biomass - chemical conversion process: hydrolysis and hydrogenation. Biogas - generation - types of biogas Plants- applications Design of bio gas digesters, landfill gas systems and gasifiers.

UNIT-4

Hydrogen and Fuel Cells

Thermodynamics and electrochemical principles - basic design, types, and applications - production methods - Bio photolysis: Hydrogen generation from algae biological pathways - Storage gaseous, cryogenic and metal hydride and transportation. Fuel cell – performance characteristics ,principle of working- various types - construction and applications.

UNIT-5

Other Types of Energy

Ocean energy resources - principles of ocean thermal energy conversion systems - ocean thermal power plants - principles of ocean wave energy conversion and tidal energy conversion – hydropower – site selection, construction, environmental issues - geothermal energy - types of geothermal energy sites, site selection, and geothermal power plants, MHD, Thermal analysis

Note: HMT Data-books and certified notes are allowed in the examination hall.

BOOKS RECOMMENDED:

- [1] Sukhatme, S.P., Solar Energy, Tata McGraw Hill, 1984.
- [2] Twidell, J.W. and Weir, A., Renewable Energy Sources, EFN Spon Ltd., 1986.
- [3] Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw-Hill, 1978.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR1G3	L	T	P		L	T	P	Total
Management Information System	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of Management Information System. The subject is useful in understanding the various information sources and database structures.

COURSE OF CONTENTS

Unit-1

Introduction to Management Information Systems

An Overview of Management Information Systems, Structure of a Management information System.

Survey of Information Systems Technology

Hardware, Software, and Communication technology for Information Systems, Storage and Retrieval of Data, Transaction Processing, Office Automation and Information processing Control Functions.

Unit-2

Conceptual Foundations

The Decision Making Process, Concepts of Information, Humans as information Processors, System Concepts, Concepts of Planing and Control, Organizational Structures and Management Concepts.

Unit-3

Information Based Support System

Support Systems for Planing, Control and Decision Making, Support Systems for Management of Knowledge Work.

Unit-4

Information System Requirements

Developing a Long Range Information System Plan, Strategies for the Determination of Information Requirements, Database Requirements, User Interface Requirements.

Unit-5

Development, Implementation and Management of Information System Resources

Developing and Implementing Application Systems, Quality Assurance and Evaluation of Information Systems, Organizational and Management of the Information Resources Functions, Future Development and Their Organizational and Social Implications.

Reference Books

- [1] Laudon, Kenneth C., and Laudon, Jane P., Management Information Systems-Managing Digital Firm, Tenth Edition, Prentice Hall, 2007
- [2] Management Information Systems, Loudon and Loudon, 10th edition, Pearsons Educations
- [3] Management Information System, Oz Thomson Learning 5th edition
- [4] Management Information System, W.S.Jawadekar, 3rd edition, TMH
- [5] Management Information System, James O'Brien, 7th edition, TMH

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.)				
				Part Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTP1G4	L	T	P		L	T	P	Total
Finite Element Analysis	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objectives & Pre requisites:

The basic objective of the subject is to deal with the fundamentals of Finite Element Methods. The subject is useful in understanding the concept of Solving problems using finite element approach.

COURSE OF CONTENT

Unit-1

Introduction

Introduction, Approximate Methods of Analysis, Finite Element Method-An Introduction, Different Approaches in FEM.

Unit-2

Finite Elements and Interpolation Functions

Interpolation Functions, One Dimensional Elements, Two Dimensional Elements, Three Dimensional Elements.

Unit-3

One Dimensional Finite Element Analysis

Linear Spring, Truss Element, 1D Torsion of a Circular Shaft, 1D Steady State Heat Conduction, 1D Flow Through Porous Media, 1D Ideal Fluid Flow Through Pipes, Beam Element, Analysis of Plane Frames and Grids.

Unit-4

Two Dimensional Finite Element Analysis

2D Flow through Porous Media, 2D Stress Analysis, Iso-Parametric Formulation, Finite Element Solution of Partial Differential Equations by Method of Weighted Residual, FEM Formulation Based on Variational Principle, Finite Element Solution of Stokes Flow Equations.

Unit-5

Three Dimensional Finite Element Analysis

Axi-Symmetric Solids, 8 Node Isoperimetric Element for 3D Stress Analysis, Computer Implementation of FEM, Applications of Finite Element Method.

Text Books

- [1] M. Desai, T. L. Eldho, A. H. Shah, "Finite Element Method with Applications in Engineering", Pearson Publication.
- [2] Robert D. Cook, David S. Malkus, Michael E. Plesha, Robert J. Witt, "Concepts and Applications of Finite Element Analysis", Wiley India (P) Ltd.
- [3] Chennakesava R. Alavala, "Finite Element Methods Basic Concepts and Applications", PHI Learning Private Limited.

Reference Books

- [1] Daryl L. Logan, "A First Course in the Finite Element Method", Cengage Learning India.
- [2] V. Ramamurti, "Finite Element Method in Machine Design", Narosa Publishing House.
- [3] Klaus Jurgen Bathe, "Finite Element Procedures", PHI Learning India.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year (Design & Thermal Engg.) (Full Time)						
Subject Code & Name	Instructions Hours per Week			Marks					
5DT606 ADVANCE MECHANICS OF SOLIDS	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objective: The basic objective of the course is to deal with advances in mechanics of materials, stresses in materials, load & deflection relationship and bending properties of material.

Pre requisites: Basic Mechanics of Solids, Material Science.

COURSE CONTENTS

UNIT-1

Stress and strain

Review: Tensile, Compressive and Shear Stresses, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus, Poisson's ratio, Relations between the three Moduli, Compound Stresses, Principle Stresses & Strain, Elastic Strain Energy, Different types of loading, Resilience, Proof Resilience, Strain Energy in Tensile, Static, Sudden falling, gradually applied and Impact loading, Strain Energy due to Shear Stresses.

UNIT -2

Stresses in Beams

Bending Stresses: Pure Bending, Moment of inertia of section, Graphical Determination of Moment of Inertia, Bending Stresses, Stress Concentration in Bending, Combined Bending and Direct Stresses, Composite Beams.

Shear Stresses: variation of Shear Stresses, Rectangular Section, I-Section, Shear Centre, Location of shear centre for various sections – shear flows.

UNIT -3

Deflection of Beams

Stresses and deflections in beams subjected to symmetrical/unsymmetrical loading-kern of a section, Strain Energy due to Bending, Applications to Impact, Deflection by Calculus, Macaulay's Method, Moment – Area Method, Method of Deflection Coefficients, Deflection due to Shear, Deflection by Graphical Method.

UNIT -4

Built - In and Continuous Beams

Moment Area Method for Built Beams, Macaulay Method, Continuous Beams.

UNIT -5

Bending of Curved Beams and Rigid Frames

Stresses in Bars of Small Initial Curvature, Stresses in Bars of Large Initial Curvature, Deflection of Curved Bars (Direct Method), and Deflection from Strain Energy (Castigliano's Theorem).

BOOKS RECOMMENDED:

- [1] Warnock Ramamurtham, *Strength of Materials*, Dhanpat Rai Publications, 1998.
- [2] Bansal R K, *Strength of Materials*, 4/e, Laxmi Publications(P) Ltd, 2007.
- [3] Popov *Mechanics of Solids*, 2/e, Prentice-Hall (India), 1999.
- [4] Timoshenko, *Elements of Strength of Materials*, 5/e, Wadsworth Publishing; 1968.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.)				
				Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR1E1	L	T	P		L	T	P	Total
Advanced Mechanics of Solids	3	1	2		3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives:

- To develop the analytical methods for solving problems in mechanics of solid those are generally considered beyond the scope of basic course in the discipline. As such, the developments tend to evolve from fundamentals principles such as equilibrium and conservation of energy.
- To understand fundamentals of linear elasticity and energy methods for solving torsion, bending problems.
- To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures using Finite Element Analysis

Prerequisites: Mechanics of Solids

COURSE OF CONTENTS

Unit-1

3D Analysis of Stresses and strains

Concept of stress at a point, stress tensor, stress on inclined plane, stress components on a rectangular parallelepiped in Cartesian coordinate system, derivation of stress equilibrium equations, transformation of stresses, strains. The state of strain at a point, strain displacement relations, strain compatibility condition and stress compatibility conditions, Relations between Elastic Constants.

Unit-2

Unsymmetrical Bending

Stresses and deflections in beams subjected to unsymmetrical loading-Kern of section, Deflection of Beams, Shear Center.

Unit-3

Bending of Curved Beams

Bending Stresses and Deflections of Curved Beams.

Unit-4

Introduction to the Finite Element Method

Introduction, Node and Element Notations, The Truss Element, Beam and Frame Elements, Two Dimensional Elastic Elements, Higher Order and Three Dimensional Elastic Elements.

Unit-5

Finite Element Modeling Techniques

Planing and Creating the Finite Element Model (Preprocessing), Element Selection and Mesh Strategy, Load Application, Constraints, Preprocessing Checks, Processing the Model and Postprocessing.

Text Books

- [1] Richard G. Budynas, Advanced Strength and Applied Stress Analysis, Mc Graw Hill Education (India), Second Edition, 2014
 [2] L. S. Shreenath, Advanced Mechanics of Solids, Tata McGraw Hill Publication, 2014

Reference Books

- [1] G H Ryder, Strength of Materials, McMillan India Ltd., Third Edition, 1969.
 [2] Timoshenko, *Elements of Strength of Materials*, 5/e, Wadsworth Publishing; 1968
 [3] Kamal Kumar and R. C. Ghai, Advanced Mechanics of Materials, Khanna Publishers, 2010.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT605 FATIGUE, CREEP & FRACTURE	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives:

The objectives of this course will be achieved by learning the phenomenon of fatigue creep & fracture Mechanism inside the metallic bodies also the behavior of the material can be understand under these states.

Prerequisites:

Strength of Material, Machine Design & Material Science.

COURSE CONTENTS

UNIT-1

Introduction

Introduction & types of fatigue creep & Fracture phenomenon. Stress Analysis under fatigue, creep & Fracture. Material selection under the given conditions.

UNIT -2

Fatigue

Types of fatigue leading and failure, Fatigue test, endurance limit, S-N diagram; Various failure relations, Viz., Soderberg, Modified Goodman-, Gerber parabolic-, Elliptical-relations; Factors influencing fatigue strength; Influence of stress concentration on fatigue test; Fretting corrosion; Effect of environment-corrosion fatigue; Increased fatigue life due to surface protection.

UNIT -3

Creep

Mechanics of creep, inter-granular, trans-granular creep, Creep test, Creep strain rate-time curves, Deformation mechanism map; High temperature properties of materials; Long time creep-stress-time relations; Creep contribution to the fracture mechanism; Creep contribution to the fracture mechanism; DVM, DVL German-standard, Hatfield time yield test.

UNIT -4

Fracture

Damage tolerance analysis, residual strength in presence of cracks; Mechanisms of crack growth and fracture; Basic modes of fracture; Stress Concentration factor, state of stress at a stress concentration, load-flow-times; Measurement of Collapse strength; Griffith's theory of brittle fracture; Irwin's theory of fracture in elastic-plastic materials; Theories of linear elastic plastic fracture mechanics (LEFM); Stress intensity fracture, toughness, stress distribution at crack tip: plane stress, plane strain cases; Theories of elastic plastic fracture mechanics (EPFM); Crack opening displacement (COD) Criterion, COD tests, crack tip opening displacement (CTOD) measurement; Crack arresters; Implementation of fracture control.

UNIT -5

Design against Creep

Types of creep, Introduction to Design against creep. Combined creep and fatigue failure prevention. Shearby Dorn Parameter, Larson Miller Parameter, Manson- Haferd Parameter.

BOOKS RECOMMENDED:

- [1] Norman E. Dowling, *Mechanical Behavior of Materials: Engineering Methods for Deformation, Fracture and Fatigue*, 3rd edition, Pearson Prentice Hall, 2007.
- [2] Shigley J.E. *Mechanical Engineering Design*, McGraw Hill 2003.
- [3] Mubeen A. "Machine Design", Khanna Publications (P) Ltd.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E. (Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1E2	L	T	P	L	T	P	Total
Fatigue Creep and Fracture	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject

The objectives of this course will be achieved by learning the phenomenon of fatigue creep & fracture Mechanism inside the metallic bodies also the behavior of the material can be understand under these states.

Prerequisites

Strength of Material, Machine Design & Material Science.

COURSE CONTENTS

UNIT-1

Introduction

Introduction & types of fatigue creep & Fracture phenomenon. Stress Analysis under fatigue, creep & Fracture. Material selection under the given conditions.

UNIT -2

Fatigue

Types of fatigue leading and failure, Fatigue test, endurance limit, S-N diagram; Various failure relations, Viz., Soderberg, Modified Goodman-, Gerber parabolic-, Elliptical-relations; Factors influencing fatigue strength; Influence of stress concentration on fatigue test; Fretting corrosion; Effect of environment-corrosion fatigue; Increased fatigue life due to surface protection.

UNIT -3

Creep

Mechanics of creep, inter-granular, trans-granular creep, Creep test, Creep strain rate-time curves, Deformation mechanism map; High temperature properties of materials; Long time creep-stress-time relations; Creep contribution to the fracture mechanism; Creep contribution to the fracture mechanism; DVM, DVL German-standard, Hatfield time yield test.

UNIT -4

Fracture

Damage tolerance analysis, residual strength in presence of cracks; Mechanisms of crack growth and fracture; Basic modes of fracture; Stress Concentration factor, state of stress at a stress concentration, load-flow-times; Measurement of Collapse strength; Griffith's theory of brittle fracture; Irwin's theory of fracture in elastic-plastic materials; Theories of linear elastic plastic fracture mechanics (LEFM); Stress intensity fracture, toughness, stress distribution at crack tip: plane stress, plane strain cases; Theories of elastic plastic fracture mechanics (EPFM); Crack opening displacement (COD) Criterion, COD tests, crack tip opening displacement (CTOD) measurement; Crack arresters; Implementation of fracture control.

UNIT -5

Design against Creep

Types of creep, Introduction to Design against creep. Combined creep and fatigue failure prevention. Shearby Dorn Parameter, Larson Miller Parameter, Manson- Haferd Parameter.

BOOKS RECOMMENDED:

- [1] Norman E. Dowling, “*Mechanical Behavior of Materials: Engineering Methods for Deformation, Fracture, and Fatigue,*” 3rd edition, *Pearson Prentice Hall*, 2007.
- [2] Shigley J.E. , “*Mechanical Engineering Design*”McGraw Hill 2003.
- [3] Mubeen A. , “*Machine Design* ”Khanna Publications (P) Ltd

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)						
Subject Code & Name		Instruction Hours per Week			Marks					
5DT607 MECHANISMS AND ROBOT KINEMATICS		L	T	P		TH	CW	SW	PR	Total
		3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours					Min	50	25	-	-	75

Objective and Pre requisites: The objective of the subject is to introduce the students about the basic analytical techniques and fundamental principles of Robot Kinematics. The Pre requisites are knowledge of the basic course in theory of machines, matrix theory, probability, computer programming and mathematical analysis.

COURSE CONTENT

UNIT-1

Introduction to Robotics & Mechanisms

Introduction, Automation and Robotics, Robot anatomy and Robot configurations, Links and joints notations, End effectors, Work volume and Obstacles, Overview of Robot drive systems and Control systems, Robot sensing, Dynamic performance and Precision of movement, Applications in Robotics.

UNIT-2

Robot Arm Kinematics

Introduction, Forward or direct Kinematics Problem, Matrix Representations, Robot arm coordinates and Transformation matrix, Composite homogeneous transformation matrix, Denavit-Hartenberg representation, Kinematic equations, Location of end effector, Inverse kinematic problem, Geometric approach for solution of inverse kinematic problem.

UNIT-3

Trajectory Planning

Introduction, Constraints and Path specifications, Basic algorithm for generation of joint trajectory, joint interpolated trajectories, Cartesian path trajectory planning.

UNIT-4

Robot Arm Control.

Fundamentals of control system theory, Joint motion controls: Servo mechanism, Computed torque technique, Minimum time control, Variable structure control. Adaptive control modes.

UNIT-5

Robot Programming and Task Planning

Introduction, Characteristics of robotic programming languages, position and motion specification, development and debugging facilities, task-level programming and robot program synthesis, Robot intelligence and task planning.

BOOKS RECOMMENDED:

- [1] Mikell P. Groover, *Industrial Robotics*, McGraw Hill Pvt. Ltd., New Delhi.
- [2] K. S. Fu, R. C. Gonzalez, C. S.G. Lee, *Robotics: Control, Sensing, Vision and Intelligence*, McGraw Hill Book Company, Singapore, International Edition 1987.
- [3] Robert J. Schilling, *Fundamentals of Robotics: Analysis & Control*, Prentice-Hall of India Private Limited, New Delhi, 5th Reprint, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1E3	L	T	P	L	T	P	Total
Mechanism and Robot Kinematics	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective and Pre requisites: The objective of the subject is to introduce the students about the basic analytical techniques and fundamental principles of Robot Kinematics. The Pre requisites are knowledge of the basic course in theory of machines, matrix theory, probability, computer programming and mathematical analysis.

COURSE CONTENT

UNIT-1

Introduction to Robotics & Mechanisms

Introduction, Automation and Robotics, Robot anatomy and Robot configurations, Links and joints notations, End effectors, Work volume and Obstacles, Overview of Robot drive systems and Control systems, Robot sensing, Dynamic performance and Precision of movement, Applications in Robotics.

UNIT-2

Robot Arm Kinematics

Introduction, Forward or direct Kinematics Problem, Matrix Representations, Robot arm coordinates and Transformation matrix, Composite homogeneous transformation matrix, Denavit-Hartenberg representation, Kinematic equations, Location of end effector, Inverse kinematic problem, Geometric approach for solution of inverse kinematic problem.

UNIT-3

Trajectory Planning

Introduction, Constraints and Path specifications, Basic algorithm for generation of joint trajectory, joint interpolated trajectories, Cartesian path trajectory planning.

UNIT-4

Robot Arm Control.

Fundamentals of control system theory, Joint motion controls: Servo mechanism, Computed torque technique, Minimum time control, Variable structure control. Adaptive control modes.

UNIT-5

Robot Programming and Task Planning

Introduction, Characteristics of robotic programming languages, position and motion specification, development and debugging facilities, task-level programming and robot program synthesis, Robot intelligence and task planning.

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- [1] Mikell P. Groover, *Industrial Robotics*, McGraw Hill Pvt. Ltd., New Delhi.
- [2] K. S. Fu, R. C. Gonzalez, C. S.G. Lee, *Robotics: Control, Sensing, Vision and Intelligence*, McGraw Hill Book Company, Singapore, International Edition 1987.
- [3] Robert J. Schilling, *Fundamentals of Robotics: Analysis & Control*, Prentice-Hall of India Private Limited, New Delhi, 5th Reprint, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year (Design & Thermal Engg.) (Full Time)						
Subject Code & Name	Instructions Hours per Week			Marks					
5DT608 THERMAL SYSTEMS: SIMULATION & DESIGN	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

COURSE CONTENTS

Objective of the Subject:

The basic objective of the subject is to have goal of achieving a workable system and of designing an optimum system. The possibility of optimization represents one of the few facets of this subject.

Pre requisites: Thermodynamics, Heat & Mass Transfer.

UNIT- 1

Designing a Workable System and its Economics:

Steps in Arriving at a Workable System, Creativity in Concept Selection, Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.

UNIT- 2

Dynamic Behaviour of Thermal Systems:

Dynamic Analysis, One Dynamic Element in a Steady State Simulation, Laplace Transformers, Inversion of Laplace Transforms, Feedback Control Loops, Time Constants Blocks, Cascaded Time Constant Blocks, Stability Analysis..

UNIT- 3

Modelling Thermal Equipment:

Using Physical Insight, Selecting vs Simulating a Heat Exchanger, Evaporators and Condensers, Condensation of a Binary Mixture, Overview of Search Methods, Assessment of Single Variable Searches.

UNIT-4

System Simulation:

Description of System Simulation, Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion, Newton Raphson Method with Multiple Equations .

UNIT- 5

Optimization:

Levels of Optimization, Mathematical Representation of Optimization Problems, Linear Programming, Setting up the Mathematical Statement, Calculus Methods of Optimization, Expansion of Lagrange Multiplier Equations, Unconstrained Optimization.

BOOKS RECOMMENDED:

- [1] Cengel YA., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e,2002.
- [2] Stoecker, WF. *Design of Thermal Systems*, McGraw Hill International Editions, New Delhi, 2007
- [3] Woodson,TT. *Introduction to Engineering Design*, McGraw Hill, New York, 1996.
- [4] Rudd, DF. *Strategy of Process Design*, McGraw Hill, New York, 1996.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				1 Year M.E.(Design & Thermal Engg.) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR1E4	L	T	P	L	T	P	Total
Thermal Systems : Simulation and Design	3	1	2	3	1	1	5
Duration of Theory Paper: <i>3 Hours</i>							

COURSE CONTENTS

Objective of the Subject:

The basic objective of the subject is to have goal of achieving a workable system and of designing an optimum system. The possibility of optimization represents one of the few facets of this subject.

Pre requisites: Thermodynamics, Heat & Mass Transfer.

UNIT- 1

Designing a Workable System and its Economics:

Steps in Arriving at a Workable System, Creativity in Concept Selection, Design of any Thermal Process Plant, Preliminaries to the Study of Optimization.

UNIT- 2

Dynamic Behaviour of Thermal Systems:

Dynamic Analysis, One Dynamic Element in a Steady State Simulation, Laplace Transformers, Inversion of Laplace Transforms, Feedback Control Loops, Time Constants Blocks, Cascaded Time Constant Blocks, Stability Analysis..

UNIT- 3

Modelling Thermal Equipment:

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UNIT-4

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Description of System Simulation, Uses of Simulation, Information Flow Diagrams, Sequential and Simultaneous Calculations, Taylor Series Expansion, Newton Raphson Method with Multiple Equations

UNIT- 5

Optimization:

Levels of Otimization, Mathematical Representation of Optimization Problems, Linear Programming, Setting up the Mathematical Statement, Calculus Methods of Optimization, Expansion of Lagrange Multiplier Equations, Unconstrained Optimization.

BOOKS RECOMMENDED

- [1] Cengel YA., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e,2002.
- [2] Stoecker, WF. *Design of Thermal Systems*, McGraw Hill International Editions, New Delhi, 2007
- [3] Woodson, TT. *Introduction to Engineering Design*, McGraw Hill, New York, 1996.
- [4] Rudd, DF. *Strategy of Process Design*, McGraw Hill, New York, 1996.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT653 MACHINERY FAULT DIAGNOSIS & SIGNAL PROCESSING	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125
Duration of Theory Paper: 3 Hours									

Objectives & Pre requisites:

The basic objective of the subject is to deal with the analysis of faults generated inside the machine during the operations. The subject provides the basic knowledge of the methods used for the prevention of the faults and also the approach for analyzing the signals generated during the faulty condition of the machine. The Pre requisites are Tribology and Vibration.

COURSE CONTENTS

UNIT- 1

Introduction to Diagnostic Maintenance and Condition Monitoring

Introduction to condition based maintenance, applications and economic benefits, signature analysis-online & offline technique, various condition monitoring techniques, levels condition monitoring, fault detection and diagnosis.

UNIT- 2

Fault Diagnosis using Vibration Monitoring

Vibration monitoring and analysis, shock pulse methods, noise monitoring, envelope detection technique, types of vibration test, field balancing, case studies on vibration based condition monitoring.

UNIT- 3

Noise Monitoring & Control

Introduction to noise, properties of noise, loudness and weighting networks, octave and FFT analysis, impulsive noise, instrumentation for noise measurement and analysis, sound power, sound intensity, noise source location, noise diagnostics, noise monitoring of machines with example, cepstrum analysis, noise control methods, maintenance and noise reduction, vehicle and machinery noise, noise standards, case studies.

UNIT-4

Advanced Methods of Condition Monitoring

Oil analysis including wear debris and contaminant monitoring, performance monitoring, non-destructive techniques, IR-Thermography, ultrasonic monitoring, reliability centred maintenance, higher order spectrum/advanced signal processing.

UNIT- 5

Computer Aided Monitoring

Application and choice of the methods, computer aided monitoring including experts system like artificial neural network, fuzzy logic and other optimizing techniques, practical applications and case studies on computer based condition monitoring.

BOOKS RECOMMENDED:

- [1] Ramamurthy V., *Mechanical Vibration Practice with Basic Theory*, Narosa Publication House, New Delhi 1e, 2002.
- [2] Rao J S & Gupta K. *Introductory Course on Theory and Practice of Mechanical Vibration*, New Age Publisher, New Delhi, 2e, 2002.
- [3] Rao J S, *Vibratory Condition Monitoring of Machine*, Narosa Publishing House, New Delhi, 1e, 2002.
- [4] Mishra R C & Pathak K., *Maintenance Engineering & Management*, Printice Hall of India, New Delhi, 1e, 2002.
- [5] Gopalkrishnan P. & Banerji AB, *Maintenance & Spare Part Management*, Printice Hall of India, New Delhi, 3e, 2002.
- [6] Hand Book of Condition Monitoring by BKN Rao, UK.

LABORATORY EXPERIMENTS:

1. Case studies based on vibration based condition monitoring.
2. Experimental analysis of Noise based condition monitoring.
3. Experimental analysis of faults using IR-Thermography .
4. Experimental analysis of faults using Non- Destructive methods.
5. Case studies on computer aided fault diagnosis.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2C1	L	T	P	L	T	P	Total
MACHINERY FAULT DIAGNOSIS & SIGNAL PROCESSING	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective & Pre requisites:

The basic objective of the subject is to deal with the analysis of faults generated inside the machine during the operations. The subject provides the basic knowledge of the methods used for the prevention of the faults and also the approach for analyzing the signals generated during the faulty condition of the machine. The Pre requisites are Tribology and Vibration.

UNIT- 1

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Introduction to condition based maintenance, applications and economic benefits, signature analysis-online & offline technique, various condition monitoring techniques, levels condition monitoring, fault detection and diagnosis.

UNIT- 2

Fault Diagnosis using Vibration Monitoring:

Vibration monitoring and analysis, shock pulse methods, noise monitoring, envelope detection technique, types of vibration test, field balancing, case studies on vibration based condition monitoring.

UNIT- 3

Noise Monitoring & Control:

Introduction to noise, properties of noise, loudness and weighting networks, octave and FFT analysis, impulsive noise, instrumentation for noise measurement and analysis, sound power, sound intensity, noise source location, noise diagnostics, noise monitoring of machines with example, cepstrum analysis, noise control methods, maintenance and noise reduction, vehicle and machinery noise, noise standards, case studies.

UNIT-4

Advanced Methods of Condition Monitoring:

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- [2] Rao J S & Gupta K. *Introductory Course on Theory and Practice of Mechanical Vibration*, New Age Publisher, New Delhi, 2e, 2002
- [3] Rao J S, *Vibratory Condition Monitoring of Machine*, Narosa Publishing House, New Delhi, 1e, 2002.
- [4] Mishra R C & Pathak K., *Maintenance Engineering & Management*, Printice Hall of India, New Delhi, 1e, 2002.
- [5] Gopalkrishnan P. & Banerji AB, *Maintenance & Spare Part Management*, Printice Hall of India, New Delhi, 3e, 2002.
- [6] Hand Book of Condition Monitoring by BKN Rao, UK.

LABORATORY EXPERIMENTS:

1. Case studies based on vibration based condition monitoring.
2. Experimental analysis of Noise based condition monitoring.
3. Experimental analysis of faults using IR-Thermography .
4. Experimental analysis of faults using Non- Destructive methods.
5. Case studies on computer aided fault diagnosis.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
SDT651 DESIGN OF HEAT TRANSFER EQUIPMENTS	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives & Pre requisites:

The basic objective of the subject is to have in-depth knowledge about the generalized modes of heat transfer and their applications in the designing of thermodynamic systems. Pre requisites are Heat & Mass Transfer & Machine Design.

COURSE CONTENTS

UNIT- 1

Steady State Heat Conduction

One Dimensional Heat Conduction Equation, General Heat Conduction Equation, Heat generation in a Solid, Variable Thermal Conductivity, Thermal Contact Resistance, Heat Conduction in Cylinders and Spheres, Critical Radius of Insulation Heat Transfer from Finned Surfaces.

UNIT- 2

Transient Heat Conduction

Lumped System Analysis, Transient Heat Conduction in Large Plane Walls and Long Cylinders, Transient Heat Conduction in Semi-Infinite Solids, Transient Heat Conduction in Multidimensional Systems, Two Dimensional Transient Heat Conduction.

UNIT- 3

Fundamentals of Convection

Physical Mechanism on Convection, Velocity Boundary Layer and Thermal Boundary Layer, Derivation of Differential Convection Equation, Natural Convection over Surfaces, Natural Convection from Finned Surfaces and PCBs, Forced Convection across Cylinders, Spheres and Tube Banks, Combined Natural and Forced Convection.

UNIT-4

Fundamentals of Thermal Radiation

Introduction, Radiative Properties, View Factor Relations, Radiation Heat Transfer, Radiation Shields and the Radiation Effects.

UNIT- 5

Heat Exchangers

Types, overall heat Transfer Coefficient, Effectiveness-NTU method, Cooling of Electronic Equipments, Cooling Load of Electronic Equipment, Conduction and Air Cooling.

BOOKS RECOMMENDED:

- [1] Cengel Y.A., *Heat Transfer-A Practical Approach*, Tata McGraw Hill, New Delhi 2e, 2002.
- [2] Rudramoorthy R., *Heat Transfer-Theory and Problems*, Pearson Education, New Delhi, 2006.
- [3] Christopher A., *Essential Heat Transfer*, Pearson Education, New Delhi, 2001.
- [4] Nag P.K., *Heat Transfer*, Tata McGraw Hill, New Delhi, 1e, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Design &Thermal Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2C2	L	T	P	L	T	P	Total
Advanced Refrigeration and Air Conditioning	3	1	2	3	1	1	5
Duration of Theory							
Paper:							
3 Hours							

Objectives & Prerequisites: Advancements in Refrigeration and Air Conditioning Technologies. Fundamentals of Thermodynamics, Heat transfer, Refrigeration cycles, Psychrometry

COURSE CONTENT

UNIT-1

Advanced Vapour Compression Technologies:

Single Stage System; Multistage Refrigeration: Two-stage with given Intermediate Pressure, Optimum Interstage Pressure, Cascade Refrigeration System; Liquefaction of Gases: Linde–Hampson Cycle: Precooled Linde–Hampson Cycle; Claude’s Cycle; Energy and Exergy analyses.

UNIT-2

Advanced Vapour Absorption and other Technologies

Vapor Absorption Systems: Ammonia-Water, Three fluid, Water-Lithium bromide; Solar-Powered Absorption Refrigeration System, Multi Stage Absorption Systems, Energy and Exergy analyses of Vapour Absorption Systems.

UNIT-3

Load Estimation and Air Conditioning Systems

Psychrometry, Psychrometric Processes, Load Estimation, Air-conditioning Systems: Classification-All Air, Air and water, All water Systems; Decentralized Cooling and Heating; Individual systems; Evaporative; Dessicant; Thermal storage; Clean room; Space systems; Packaged; Central systems

UNIT-4

Fans and Duct Design

Fans: Classification, Performance Characteristics and selection; Flow basics: Continuity Equation, Bernoulli’s Equation, Flow head loss; Ducts: Types, pressure characteristics, system pressure loss; Duct design: Equal-friction, Constant-velocity method, Static regain method

UNIT-5

Controls

Control Loop and Control Methods; Control Modes: Two-position, Step and Modulating, Floating, Proportional; Proportional plus Integral (PI), Proportional-Integral-Derivative (PID); Controllers: Direct / Reverse acting, Pneumatic, electric, digital; Valves and actuator; Dampers

BOOKS RECOMMENDED:

1. W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 4e, 1985
2. Prasad M, *Refrigeration and Air conditioning*, New Age International, 2e, 2011
3. Arora C P *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
4. W.F. Stoecker, *Refrigeration and Air conditioning*, McGraw-Hill Book Company, 1e, 1985
5. Shan Wang, *Handbook of Air-Conditioning and Refrigeration*, McGraw-Hill Book Company, 2e, 2000
6. McQuiston F C., Parker J.D. and Spitler J. D., *Heating, Ventilating, and Air-Conditioning Analysis and Design*, John Wiley& Sons, 6e, 200

LABORATORY EXPERIMENTS:

1. To calculate actual and ideal Coefficient of Performance of vapour compression trainer.
2. To calculate actual and ideal Coefficient of Performance of vapour Absorption System
3. To carry out various psychrometric process in Air-conditioning trainer.
4. To estimate the Heating and cooling load of an enclosure
5. To design a duct network for a given plan

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT656 COMPUTER AIDED MECHANISM DESIGN	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives: To understand the application of Computers in Mechanism Analysis and Design of Machine Elements.

Pre requisites: Engineering Drawing, Programming with C++ / Visual Basic / Java.

COURSE CONTENTS

UNIT 1

Introduction

Fundamentals of CAD: Introduction: Design Process: Application of computers in design: Creating manufacturing database: benefits of CAD. Computer Hardware: Graphic input devices; display devices; Graphic output devices; Central processing unit (CPU), Workstations.

UNIT 2

Computer Graphics

CAD software and Database: Software configuration of a graphics system, Output primitives frame buffer – Bresenham's Algorithm – Line – Circle – function of graphics software - 2D & 3D transformation – Translation – scaling – Rotation – Homogeneous coordinate – Concatenation clipping algorithm.

UNIT 3

Techniques For Geometric Modeling

Geometric modelling: curves and surfaces- Representation, Wire Frame models, Intrinsic and parametric representations, analytic and parametric curves and surfaces, Manipulations of curves and surfaces.

Geometric Modeling: Solids

Solid models, Fundamentals of Solid Modeling, Half -spaces, Boundary Representation (B-rep), Constructive Solid Geometry (CSG), Sweep Representation, Analytic Solid Modeling, Solid Manipulations.

UNIT 4

DATA EXCHANGE STANDARDS

Graphics standards – GKS, Data exchanger standards – IGES – STEP - DXF – Concept of data storage for solid models. ~~Mechanisms And Machines – Review of various types of mechanisms and machine linkages, Conventional methods of velocity and acceleration analysis.~~

UNIT 5

~~INTRODUCTION TO PARAMETRIC MODELING~~

~~Computer Aided Analysis and Synthesis of Mechanisms, Writing of interactive computer program for design of simple machine elements and parametric drawing / model creation using C / C++ / Visual Basic / Java etc.~~

BOOKS RECOMMENDED:

- [1] Rogers D.F., *Mathematical Elements in Computer Graphics*, McGraw – Hill Book Company, NewYork, 1976.
- [2] Zeid I., *Mastering CAD / CAM*, TataMcGraw Hill Edition, New Delhi, 2005.
- [3] Rooney J., *Computer Aided Design*, Pitman/Open University, London.
- [4] Krishnamoorthy C.S., *Computer Aided Design (Software and Analysis Tools)*, Narosa Pub House, New Delhi.
- [5] S. S. Rattan, *Theory of Machines*, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2005.

Devi Ahilya University, Indore, India			1 Year M.E. (Design & Thermal				
Institute of Engineering & Technology			Engg.) Full Time				
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2C3 Computer Aided Modeling and Simulation	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives:

To understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.

To model complex shapes including freeform curves and surfaces.

To understand various graphics standard for CAD data exchange (such as IGES, PARA etc).

To understand the application of Computers in Analysis and Design of Machine Elements.

Prerequisite:

COURSE CONTENT

UNIT - 1

INTRODUCTION

Fundamentals of CAD: Introduction: Design Process: Application of computers in design: Benefits of CAD. Computer Hardware: Graphic input devices; display devices; Graphic output devices; Central processing unit (CPU), Workstations.

UNIT- 2

COMPUTER GRAPHICS

CAD software and Database: Software configuration of a graphics system, Output primitives frame buffer – Bresenham’s Algorithm – Line – Circle – function of graphics software - 2D & 3D transformation – Translation – scaling – Rotation – Homogeneous coordinate – Concatenation, clipping algorithm.

UNIT - 3

TECHNIQUES FOR GEOMETRIC MODELING

Geometric Modelling: Curves And Surfaces- Representation, Wire Frame models, Intrinsic and parametric representations, analytic and parametric curves and surfaces, Manipulations of curves and surfaces.

UNIT- 4

TECHNIQUES FOR GEOMETRIC MODELING AND DATA EXCHANGE STANDARDS

Geometric Modeling: Solids- Solid models, Fundamentals of Solid Modeling, Half -spaces, Boundary Representation (B-rep), Constructive Solid Geometry (CSG), Sweep Representation, Analytic Solid Modeling, Solid Manipulations.

Graphics standards – GKS, Data exchanger standards – IGES – STEP - DXF – Concept of data storage for solid models.

UNIT - 5

VISUAL REALISM

Introduction, Model Clean-up, Hidden Line Removal, Hidden Surface Removal, Hidden Solid Removal, Shading, Coloring and User Interface for Shading and Coloring,

Introduction to CAD Modeling Systems. Tolerance and Interference Analysis

Text Book:

- [1.] Zeid Ibrahim and R Sivasubramanian, *CAD / CAM Theory and Practice*, 2nd Edition, 3rd Reprint, 2010, Tata McGraw Hill Education Private Limited, New Delhi.
- [2.] P N Rao, *CAD/CAM Principles and Applications*, 3rd Edition, 4th Reprint, 2011, Tata McGraw Hill Education Private Limited, New Delhi.
- [3.] M Groover and E Zimmers, *CAD/CAM Computer Aided Design and Manufacturing*, 10th Impression, Pearson Education.
- [4.] Krishnamoorathy C.S. and J.S. Rajeev, *Computer Aided Design (Software and Analysis Tools)*, Narosa Pub House, New Delhi

List of Practicals:

1. To draw the basic geometrical shapes such as line, triangle, rectangle etc using programming language Autolisp/C++/etc.
2. To perform the various geometrical transformations on the geometrical shapes drawn in practical 1 using programming language Autolisp/C++/etc.
3. To model the simple machine elements like gear, shaft, pulleys, cams etc parametrically using CAD/CAM software.
4. To obtain the 2d drawings from the 3d object created in practical 3.
5. To create the assembly of machine elements using CAD/CAM software.
6. To perform the finite element analysis of machine elements using CAD/CAM Software.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR2S2: Soft Skill-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking, Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
- [3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ramneek Kapoor, Managerial Skills, Pathmaker Bangalore, Nakoda Publishers & Printers, 1st Ed.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E.(Design& Thermal) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTR2G1 Advanced Heat Transfer	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Objectives & Pre requisites:

Advancements in the topics on Heat Transfer Engineering. Fundamentals of Thermodynamics, Heat transfer at Undergraduate level

COURSE CONTENT

UNIT-1

Steady State Unidirectional Heat Conduction with Heat Generation:

Heat flow through slab with heat generation, Heat flow through cylinder with heat generation, Dielectric heating, Heat conduction with heat generation when generation is a function of position, Heat conduction with heat generation when generation is a function of temperature, Steady state two dimensional heat conduction, Purpose of Insulation, Critical Radius of Insulation.

UNIT-2

Unsteady State Unidirectional Heat Conduction:

Unsteady state heating or cooling, Unsteady state heat conduction through finite slab with negligible thermal resistance, Unsteady state heat conduction through finite slab with thermal resistance, Heisler charts, Periodic heat flow.

UNIT-3

Thermodynamic Analysis of Heat Exchangers:

Introduction, Temperature distribution and heat flow, Overall heat transfer coefficient, Fouling of Heat Exchangers, Effectiveness method (NTU) to study the performance of Heat Exchangers, Second Law analyses of Counter and Parallel flow type Heat Exchangers (Exergy Analysis), Finite Time Thermodynamic (FTT) analyses of Heat Exchangers.

UNIT-4

Advanced Convection Principles

Conservation principles; Differential and Integral Equations of momentum and Energy for Laminar and Turbulent Boundary Layers; Heat Transfer in Laminar Internal and External Flows: Axial Variations of Surface temperature and Heat flux; Heat Transfer in Turbulent internal and External Flows.

UNIT-5

Advanced Radiation

Review of fundamentals; View factors: Definition and Evaluation, Area Integration, Contour Integration, View factor algebra, Inside sphere method, unit sphere method, Radiative Heat exchange between gray diffuse surfaces; solution methods for governing integral methods, Partially specular gray and nonideal surfaces.

BOOKS RECOMMENDED:

1. Bergman T.L., Lavine A. S., Incropera F. P. and Dewitt D. P. , *Fundamentals of Heat And Mass Transfer*, John Wiley & Sons, 7e, 2011
2. Kreith F., Manglik R. M., and Bohn M. S., *Principles of Heat Transfer*, Cengage Learning, 7e 2011
3. Kays W., Crawford M., Weigand B., *Convective Heat and Mass Transfer*, McGraw-Hill Book Company, 4e, 2005
4. Modest M. F., *Radiative Heat Transfer*, McGraw-Hill, Inc. 1993
5. Bejan A, *Convective Heat Transfer*, McGraw-Hill Book Company, 4e, 2005.
- 6.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year ME (Design & Thermal Engg.) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits				
DTR2G2 RAPID PROTOTYPING	L	T	P		L	T	P	Total
	3	1	0		3	1	0	4
Duration of Theory Paper: 3 Hours								

Objective: To understand the basics of non-conventional prototyping processes.

COURSE OF CONTENT

UNIT-1

Basic operation, Role of Rapid Prototyping and tooling in product development and simultaneous engineering, Applications.
Rapid Prototyping Processes

Principles of RP processes, Classification, Laminated object manufacturing, Fused deposition modeling, Sterolithography, Solid ground curing, Selective laser sintering - 3D printing.

UNIT-2

CAD Requirements in RP

Introduction, Data requirements, Solid modeling, Surface modeling, Geometric processing, Interface formats, Model preparation, Slicing, Support structures and machine instructions

UNIT-3

Materials for Rapid Prototyping

Plastics, Resins, Metals, Ceramics, Selection of Materials for suitable processes, Advantages and limitations.

UNIT-4

Rapid Tooling Techniques

Rapid tooling techniques such as Silicone rubber molding, Epoxy molding, Electroforming, Vacuum casting, Vacuum forming, Laminated metallic tooling, Direct metal laser sintering.

UNIT-5

Rapid Manufacture

Introduction, Material and process controls for Rapid manufacture, Production economics, Implementation, Applications, automotive, aeronautical, space applications, additive manufacturing for construction industry, retail industry

Text Books

- [1.] Pham, D.T., Dimov, S.S. (2001) Rapid Manufacturing, Springer-Verlag London Limited.
- [2.] Neil Hopkinson, Richard Hague, Philip Dickens (Editors) Rapid Manufacturing: An Industrial Revolution for the Digital Age, Wiley Publication, 2005.
- [3.] Rafiq I. Noorani, Rapid Prototyping: Principles and Applications, Wiley Publication, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT659 COGENERATION AND WASTE HEAT RECOVERY	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives & Pre requisites:

The objective of the subject is to provide an understanding of energy conservation in various thermal engineering applications. The Pre requisites are Thermodynamics, Fluid Mechanics and Heat Transfer.

COURSE CONTENT

UNIT- 1

Energy Usage and Conservation

Energy: forms and Conversion; Patterns of energy use; potential for energy conservation; optimum use of energy resources; total energy approach.

UNIT- 2

Thermodynamic Cycles and Cogeneration

Review of Various Thermodynamic cycles; Coupled cycles; Systems approach to a thermal engineering application based plants; combined plants and cogeneration systems.

UNIT- 3

Energy Storage

Energy Storage Systems: thermal electrical, magnetic and chemical energy storage systems, Need for energy storage; Utilization of industrial waste heat: gas-to-gas, gas-to-liquid and liquid-to-liquid heat recovery systems.

UNIT-4

Waste Heat Recovery

Heat Recovery systems; Recuperators and regenerators; heat pipes; waste heat boilers; fluidized bed heat recovery; shell and tube heat exchangers

UNIT- 5

Heat Recovery Sources

Sources of heat recovery; Prime mover exhausts; incineration plants; heat pump systems; thermoelectric devices. Utilization of low grade rejected heat from power plants.

BOOKS RECOMMENDED:

- [1] Reay, D. A., *Heat Recovery Systems*, London, 1979.
- [2] Boyce, M, P., *Handbook for Cogeneration and Combined Cycle Power Plants*, ASME 2002
- [3] Fin David, *Cogeneration: A Users Guide*, IET
- [4] Daiment, *Energy Systems*, Longman, UK

Devi Ahilya University, Indore, India Institute of Engineering & Technology			M.E.(Design & Thermal) Full Time				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
DTR2G3 COGENERATION AND WASTE HEAT RECOVERY	3	1	-	3	1	-	4
Duration of Theory Paper: 3 Hours							

Objective & Pre requisites:

The objective of the subject is to provide an understanding of energy conservation in various thermal engineering applications. The Pre requisites are Thermodynamics, Fluid Mechanics and Heat Transfer.

COURSE CONTENT

UNIT- 1

Energy Usage and Conservation

Energy: forms and Conversion; Patterns of energy use; potential for energy conservation; optimum use of energy resources; total energy approach.

UNIT- 2

Thermodynamic Cycles and Cogeneration

Review of Various Thermodynamic cycles; Coupled cycles; Systems approach to a thermal engineering application based plants; combined plants and cogeneration systems.

UNIT- 3

Energy Storage

Energy Storage Systems: thermal electrical, magnetic and chemical energy storage systems, Need for energy storage; Utilization of industrial waste heat: gas-to-gas, gas-to-liquid and liquid-to-liquid heat recovery systems.

UNIT-4

Waste Heat Recovery

Heat Recovery systems; Recuperators and regenerators; heat pipes; waste heat boilers; fluidized bed heat recovery; shell and tube heat exchangers

UNIT- 5

Heat Recovery Sources

Sources of heat recovery; Prime mover exhausts; incineration plants; heat pump systems; thermoelectric devices. Utilization of low grade rejected heat from power plants.

BOOKS RECOMMENDED

- [1] Reay, D. A., *Heat Recovery Systems*, London, 1979.
- [2] Boyce, M, P., *Handbook for Cogeneration and Combined Cycle Power Plants*, ASME 2002
- [3] Fin David, *Cogeneration: A Users Guide*, IET
- [4] Daiment, *Energy Systems*, Longman, UK

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT654 MACHINE VIBRATIONS ANALYSIS	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of Theory Paper: 3 Hours				Min	50	25	25	25	125

Objectives & Pre requisites: The objective of the subject is to deal with machine vibration analysis techniques and advanced areas of vibrations of machine elements based on Undamped and Damped Free Vibrations for single degree of freedom systems, Multi-degree of Freedom and Continuous Systems . Pre requisites are Theory of vibrations , Machine Design I and Machine Design II.

COURSE CONTENTS

UNIT-1

Review: Fundamentals of Vibration

Main causes, Advantages and Disadvantages. Vector method of representing Harmonic motion. Characteristics of vibration. Harmonic analysis. Beats Phenomenon. Work done by harmonic forces on harmonic motion. Periodic, non-harmonic functions: Fourier Series analysis, Evaluation of coefficients of Fourier series. Elements of vibratory system. Lumped and distributed parameter systems.

UNIT -2

Systems with single and two Degrees of Freedom

Forced harmonic vibration: vector representation of forces. Excitation due to Rotating and Reciprocating unbalance. Vibration isolation, Force transmissibility. Motion transmissibility: absolute motion of mass and relative motion of mass. Undamped free vibrations and Principal Modes of vibration. Torsional vibrations. Forced Undamped vibrations with harmonic excitation.

UNIT -3

Systems with Multi-degree of Freedom and Continuous Systems.

Equations of motion. The Matrix method: Eigen values and eigen vectors. Vibration of Strings. Longitudinal vibrations of bars. Torsional vibrations of Circular Members. Transverse Vibrations of Beams.

UNIT -4

Determination of Natural Frequencies

Approximate methods of determining fundamental frequencies: Dunkerleys lower bound approximation and Rayleighs Method. Stodolas Method. The Holzers Method. The Method of Matrix Iteration, Envelop Analysis.

UNIT -5

Numerical Integration methods in Vibration Analysis

Introduction, Finite Difference Method, Runge-Kutta Method for single degrees of freedom systems, Houbolt method , Finite Difference method for continuous systems.

BOOKS RECOMMENDED:

- [1] Thomson W.T., *Theory of Vibration with Applications*, CBS Pub. And Distributors.
- [2] Morse T., and Hinkle, *Mechanical Vibration*, Prentice Hall of India Pvt. Ltd.
- [3] Singiresu S. Rao, *Mechanical Vibrations*, Pearson Education., 2005
- [4] Ambekar A. G., *Mechanical Vibrations and Noise Engineering*, Prentice Hall of India Pvt. Ltd., 2006
- [5] G. K. Grover, *Mechanical Vibrations*, Nem Chand and Bros., Roorkee.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week						
DTR2E1 MACHINE VIBRATIONS ANALYSIS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective of the subject: The objective of the subject is to deal with machine vibration analysis techniques and advanced areas of vibrations of machine elements based on Undamped and Damped Free Vibrations for single degree of freedom systems, Multi-degree of Freedom and Continuous Systems .

Pre requisites are Theory of vibrations , Machine Design I and Machine Design II.

UNIT-1

Review: Fundamentals of Vibration

Main causes, Advantages and Disadvantages. Vector method of representing Harmonic motion. Characteristics of vibration. Harmonic analysis. Beats Phenomenon. Work done by harmonic forces on harmonic motion. Periodic, non-harmonic functions: Fourier Series analysis, Evaluation of coefficients of Fourier series. Elements of vibratory system. Lumped and distributed parameter systems.

UNIT -2

Systems with single and two Degrees of Freedom

Forced harmonic vibration: vector representation of forces. Excitation due to Rotating and Reciprocating unbalance. Vibration isolation, Force transmissibility. Motion transmissibility: absolute motion of mass and relative motion of mass.

Undamped free vibrations and Principal Modes of vibration. Torsional vibrations. Forced Undamped vibrations with harmonic excitation.

UNIT -3

Systems with Multi-degree of Freedom and Continuous Systems.

Equations of motion. The Matrix method : Eigen values and eigen vectors. Vibration of Strings. Longitudinal vibrations of bars. Torsional vibrations of Circular Members. Transverse Vibrations of Beams.

UNIT -4

Determination of Natural Frequencies

Approximate methods of determining fundamental frequencies: Dunkerleys lower bound approximation and Rayleighs Method. Stodolas Method. The Holzers Method. The Method of Matrix Iteration, Envelop Analysis.

UNIT -5

Numerical Integration methods in Vibration Analysis

Introduction, Finite Difference Method, Runge-Kutta Method for single degrees of freedom systems, Houbolt method ,Finite Difference method for continuous systems.

BOOKS RECOMMENDED: Reference books:

- [1] Thomson W.T., *Theory of Vibration with Applications*, CBS Pub. And Distributors.
- [2] Morse T., and Hinkle, *Mechanical Vibration*, Prentice Hall of India Pvt. Ltd.
- [3] Singiresu S. Rao, *Mechanical Vibrations*, Pearson Education.,2005
- [4] Ambekar A. G., *Mechanical Vibrations and Noise Engineering* , Prentice Hall of India Pvt. Ltd.,2006
- [5] G. K. Grover, *Mechanical Vibrations*, Nem Chand and Bros., Roorkee.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) Full Time					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT657 EXPERIMENTAL STRESS ANALYSIS	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Objectives & Pre requisites:

The basic objective of the subject is to deal fundamentals of stress analysis techniques. The subject is useful in understanding the behavior of material under the load and distribution of stress inside the material. The Pre requisites are material science, machine design and measurement and control.

COURSE CONTENTS

UNIT- 1

Introduction

Introduction to theory of elasticity. General principles governing the approach to experimental stress analysis technique. Principal of measurements. Accuracy, Sensitivity and range of measurement.

UNIT- 2

Polariscope & Extensometer

Plain polariscope, circular polariscope, white light illumination, analysis of photoelastic data, Moira Method, Mechanism of formation of Moira fringe-geometrical approach to Moire fringe analysis-displacement field approach to Moire fringe analysis., Mechanical , Optical , Acoustical and Electrical extensometer and their uses, advantages and disadvantages.

UNIT- 3

Electrical Resistance Strain Gauge

Principal of operation and requirement, types and their uses, Material of strain gauge, Calibration and temperature compensation, cross sensitivity, Rosette analysis, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators, strain gauge adhesive and mounting methods.

UNIT-4

Photoelasticity

Two dimensional photoelasticity. Concepts of light-photo-elastic effects, stress optic law, Interpretation of fringe pattern, compensation and separation technique, photoelastic material, Introduction to three dimensional photoelasticity, digital photoelasticity, Effects of stressed model in a plane polariscope.

UNIT- 5

Non Destructive Testing

Fundamentals of NDT, Radiography, Ultrasonic, Magnetic particle inspection, Fluorescent penetrate technique, Eddy current testing, Acoustic Emission Technique, Fundamentals of brittle coating methods, Holography, Ultrasonic, C-Scan, Thermography, Fibre optic Sensors.

BOOKS RECOMMENDED:

- [1] Dally J.W., *Experimental Stress Analysis*, Mc Graw Hill Inc., New York, 1978
- [2] Hetenyi M., *Hand Book of Experimental Stress Analysis*, John Wiley and Sons Inc., New York, 1972.
- [3] Srinath L.S., *Experimental Stress Analysis*, Tata Mc Graw Hill, New Delhi, 1984.
- [4] Singh S., *Experimental Stress Analysis*, Khanna Publication, 2001.
- [5] Mubeen A., *Machine Design*, , Khanna Publications(P) Ltd.,2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2E2	L	T	P	L	T	P	Total
EXPERIMENTAL STRESS ANALYSIS	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

COURSE CONTENTS

Objective & Pre requisites:

The basic objective of the subject is to deal fundamentals of stress analysis techniques. The subject is useful in understanding the behavior of material under the load and distribution of stress inside the material. The Pre requisites are material science, machine design and measurement and control.

UNIT- 1

Introduction:

Introduction to theory of elasticity. General principles governing the approach to experimental stress analysis technique. Principal of measurements. Accuracy, Sensitivity and range of measurement.

UNIT- 2

Polariscope & Extensometer:

Plain polariscope, circular polariscope, white light illumination, analysis of photoelastic data, Moira Method, Mechanism of formation of Moira fringe-geometrical approach to Moire fringe analysis-displacement field approach to Moire fringe analysis., Mechanical , Optical , Acoustical and Electrical extensometer and their uses, advantages and disadvantages.

UNIT- 3

Electrical Resistance Strain Gauge:

Principal of operation and requirement, types and their uses, Material of strain gauge, Calibration and temperature compensation, cross sensitivity, Rosette analysis, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators, strain gauge adhesive and mounting methods.

UNIT-4

Photoelasticity:

Two dimensional photoelasticity. Concepts of light-photo-elastic effects, stress optic law, Interpretation of fringe pattern, compensation and separation technique, photoelastic material, Introduction to three dimensional photoelasticity, digital photoelasticity, Effects of stressed model in a plane polariscope.

UNIT- 5

Non Destructive Testing:

Fundamentals of NDT, Radiography, Ultrasonic, Magnetic particle inspection, Fluorescent penetrate technique, Eddy current testing, Acoustic Emission Technique, Fundamentals of brittle coating methods, Holography, Ultrasonic, C-Scan, Thermography, Fibre optic Sensors.

BOOKS RECOMMENDED

- [1] Dally J.W. and Riley, W.F. “*Experimental Stress Analysis*” Mc Graw Hill Inc., New York, 1978
- [2] Hetenyi M “*Hand Book of Experimental Stress Analysis*” John Wiley and Sons Inc. New York, 1972.
- [3] Srinath L.S., Raghava M.R.,Lingaiah, K.Gargesha G, Pant B, Ramchendra K., “*Experimental Stress Analysis*” Tata Mc Graw Hill, New Delhi., 1984
- [4] Singh S. “*Experimental Stress Analysis*” Khanna Publication, 2001.
- [5] Mubeen., *Machine Design*, , Khanna Publications(P) Ltd.,2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT655 APPLIED ELASTICITY AND PLASTICITY	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
	Duration of Theory Paper: 3 Hours			Min	50	25	-	-	75

Objectives:

With this subject, the students get knowledge of the various Mechanical engineering materials property as well as behavior of material under Elastic & Plastic zone with different plane of surface.

Prerequisite: Strength of Material, Material Science.

COURSE CONTENTS

UNIT - 1

Elasticity

Analysis of stress and strain relationship – Generalized Hook’s law, Plane stress and plane strain problems, The state of strain at a point, Basic equations of elasticity, Methods of solution of elasticity problems.

UNIT- 2

Two-Dimensional Problems in Cartesian Co-Ordinates

Two dimensional problems in Cartesian and polar co-ordinates for simple problems, Airy’s stress function, Bi harmonic equation, Saint Venant’s Principle, Thick cylinder, Bending of curve bars , Simply supported rectangular beam under a triangular load, Fourier series, Complex potentials, Cauchy integral method , Fourier Transform Method, Real potential methods.

UNIT-3

Torsion of Non Circular Section

Methods of analysis, Membrane analogy, Torsion of thin rectangular section and hollow thin walled section, St. Venant’s theory, Torsion of hollow cross-sections, Torsion of thin – walled tubes, Torsion of hollow bars, Analogous methods, Torsion of bars of variable diameter.

UNIT-4

Numerical and Energy Methods

Principle of Virtual Work-Energy theorem, Rayleigh Ritz method, Deflection of beams problems, Finite difference method, Rayleigh’s method, Finite element method.

UNIT-5

Plasticity

Physical assumption , Mechanical models, Kelvin and Maxwell model, Viscous elasticity, Friction and Coulomb models, Parallel and Hybrid models, Applications, Criterion of Yielding, Yield surface, Flow rule, Elastic – Plastic problem in bending, Torsion and Thick cylinders, Introduction to Fracture mechanics, Wave propagation in plastic materials. Theory and application of slip line field, Bound theorem, Plastic anisotropic large deformation.

BOOKS RECOMMENDED:

- [1] Timoshenko S., *Theory of Elasticity*, Mc Graw Hill Book Co., Newyork1988.
- [2]. Singh S, *Theory of Elasticity*, Khanna Publishers, New Delhi.1988.
- [3] Singh S., *Theory of Plasticity*, Khanna Publishers, New Delhi.1988.
- [4] Chakrabarty J., “*Applied Plasticity*”, Springer New Yark, 1st ed. 2000.
- [5] Hoffman, “*Theory of Plasticity*”, Mc Graw Hill, 2nd ed. 1985.
- [6] Johnson, “*Engineering plasticity*”, Van Nostrand, 1st ed. 1983.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per Week			Credits			
DTR2E3	L	T	P	L	T	P	Total
APPLIED ELASTICITY AND PLASTICITY	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective of the subject:

With this subject, the students get knowledge of the various Mechanical engineering materials property as well as behavior of material under Elastic & Plastic zone with different plane of surface.

Prerequisite(s): Strength of Material, Material Science.

COURSE CONTENTS

UNIT - 1

Elasticity

Analysis of stress and strain relationship – Generalized Hook’s law, Plane stress and plane strain problems, The state of strain at a point, Basic equations of elasticity, Methods of solution of elasticity problems.

UNIT- 2

Two-Dimensional Problems in Cartesian Co-Ordinates

Two dimensional problems in Cartesian and polar co-ordinates for simple problems, Airy’s stress function, Bi harmonic equation, Saint Venant’s Principle, Thick cylinder, Bending of curve bars , Simply supported rectangular beam under a triangular load, Fourier series, Complex potentials, Cauchy integral method , Fourier Transform Method, Real potential methods.

UNIT-3

Torsion of Non Circular Section

Methods of analysis, Membrane analogy, Torsion of thin rectangular section and hollow thin walled section, St. Venant’s theory, Torsion of hollow cross-sections, Torsion of thin – walled tubes, Torsion of hollow bars, Analogous methods, Torsion of bars of variable diameter.

UNIT-4

Numerical and Energy Methods

Principle of Virtual Work-Energy theorem, Rayleigh Ritz method, Deflection of beams problems, Finite difference method, Rayleigh’s method, Finite element method.

UNIT-5

Plasticity

Physical assumption , Mechanical models, Kelvin and Maxwell model, Viscous elasticity, Friction and Coulomb models, Parallel and Hybrid models, Applications, Criterion of Yielding, Yield surface, Flow rule, Elastic – Plastic problem in bending, Torsion and Thick cylinders, Introduction to Fracture mechanics, Wave propagation in plastic materials. Theory and application of slip line field, Bound theorem, Plastic anisotropic large deformation.

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- [1] Timoshenko S., *Theory of Elasticity*, Mc Graw Hill Book Co., Newyork1988.
- [2]. Singh S, *Theory of Elasticity*, Khanna Publishers, New Delhi.1988.
- [3] Singh S., *Theory of Plasticity*, Khanna Publishers, New Delhi.1988.
- [4] Chakrabarty J., “*Applied Plasticity*”, Springer New Yark, 1st ed. 2000.
- [5] Hoffman, “*Theory of Plasticity*”, Mc Graw Hill, 2nd ed. 1985.
- [6] Johnson, “*Engineering plasticity*”, Van Nostrand, 1st ed. 1983.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year (Design & Thermal Engg.) (Full Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5DT658 AUTOMOTIVE SYSTEM ANALYSIS & DESIGN	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75
Duration of Theory Paper: 3 Hours									

Objectives: The objective is to understand the principles and working of different systems of Automobiles & design principal & its applications.

Pre requisites: Machine Design and Strength of Material.

COURSE CONTENT

UNIT-1

Design for Tool Drive

Design of machine tools, machine tools motions, transmission-rotation in to rotation, rotation in to translation, kinematic-structures of machine tools: elementary, complex and compound structure elementary, complex and compound structure, kinematic-features of gear shapers and gear hobbing machine.

UNIT-2

Transmission System

Requirements Clutches, Toque converters, Over Drive and free wheel, Universal joint. Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle. Castor Angle, wheel camber, Steering geometry, Ackerman mechanism.

UNIT-3

Electrical and Control Systems

Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Electric fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Battery operated vehicles. Microprocessor based control system for automobiles, Car air conditioning systems and components, Indian standards for automotive vehicles exhaust emission Bharat and Euro norms, Indian Motor vehicle act- preliminary information.

UNIT-4

Chassis and Body Engineering

Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Location of engine, Front wheel and rear wheel drive, Performance of Vehicle.

UNIT-5

Suspension System

Vehicle Dynamics and requirement of suspension , Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, ABS, Performance- Braking efforts, Efficiency, Stopping Distance & time, tendency of overturning.

BOOKS RECOMMENDED:

- [1] Singh Kirpal, *Automobile Engineering*, Vol.1, Standard Pub, 9e, 2003.
- [2] Giri N.K., *Automotive Technology*, Khanna Pub, 4e, 2009.
- [3] Newton & Steeds, *Automobile Engineering*, Butterworth Int, 1999.
- [4] Heitner Joseph, *Automotive Mechanics*, Principles and Practices, East-West Pub., 2001.
- [5] Crouse W.H., *Automotive series Part-I to VI*, Tata Mc Graw hill, 9e, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				M.E.(Design & Thermal) Full Time			
Subject Code & Name	Instructions Hours per			Credits			
	Week			L	T	P	Total
DTR2E4 AUTOMOTIVE SYSTEM ANALYSIS & DESIGN	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: The objective is to understand the principles and working of different systems of Automobiles & design principal & its applications.

Pre requisites: Machine Design and Strength of Material.

COURSE CONTENT

UNIT-1

Design for Tool Drive

Design of machine tools, machine tools motions, transmission-rotation in to rotation, rotation in to translation, kinematic-structures of machine tools: elementary, complex and compound structure elementary, complex and compound structure, kinematic-features of gear shapers and gear hobbing machine.

UNIT-2

Transmission System

Requirements Clutches, Toque converters, Over Drive and free wheel, Universal joint. Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle. Castor Angle, wheel camber, Steering geometry, Ackerman mechanism.

UNIT-3

Electrical and Control Systems

Types of storage battery, Construction and operation of lead acid battery, Testing of battery, Principle & operation of starting mechanism, Electric fuel gauge, Fuel pump, Horn, Wiper, Lighting system, Head light dazzling, Signaling devices and circuit, Battery operated vehicles. Microprocessor based control system for automobiles, Car air conditioning systems and components, Indian standards for automotive vehicles exhaust emission Bharat and Euro norms, Indian Motor vehicle act- preliminary information.

UNIT-4

Chassis and Body Engineering

Chassis classification, Types of frames, Vehicle body types & construction, Body materials, Driver's visibility and methods for improvement, Safety aspects of vehicles, Location of engine, Front wheel and rear wheel drive, Performance of Vehicle.

UNIT-5

Suspension System

Vehicle Dynamics and requirement of suspension , Suspension types & construction, Shock absorber, Types of leaf springs coil spring, Air spring, Torsion bar, Location of shackles, Brakes-classification & construction, Mechanical, Hydraulic & Pneumatic power brake systems, Air-bleeding of Hydraulic brakes, ABS, Performance- Braking efforts, Efficiency, Stopping Distance & time, tendency of over turning.

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- [2] Giri N.K., Automotive Technology, Khanna Pub, 4e 2009.
- [3] Newton & Steeds, Automobile Engineering, Butterworth Int.
- [4] Heitner Joseph, Automotive Mechanics, Principles and Practices, East-West Pub.
- [5] Crouse W.H., Automotive series Part-I to VI, Tata McGrawhill, 9e.

Academic Year: July-2015 to June-2016
 Programme: M.E (FT) I Branch :Computer Engineering (Software Engineering)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1			SER1C1	Advanced Algorithms	100%
2	SCO202	Object Oriented Analysis & Modeling	SER1C2	Object Oriented Analysis & Design	40%
3	SCO203	Software Construction	SER1C3	Software Construction	20%
4	SCO254	Database Engineering	SER1E1	Database Engineering	30%
5			SER1E2	Big Data Analytics	100%
6			SER1E3	Secure Software Engineering	100%
7			SER1G1	Soft Computing	100%
8			SER1G2	Distributed Operating System	100%
9	SCO201	Advance Computer Systems	SER1G3	Advance Computer Architecture	60%
10			ASR1S1	Soft Skills -1	100%
11	SCO285	Project Management	SER2C1	Software Project Planning and Management	80%
12	SCO251	Design Patterns	SER2C2	Design Pattern	20%
13	SCO257	Software Testing & Quality Assurance	SER2C3	Software Testing and Quality Assurance	5%
14	SCO206	Speech & Language Processing	SER2E1	Speech And Language Processing	20%
15	SCO238	Machine Learning	SER2E3	Machine Learning	40%
16			SER2E2	Aspect Oriented Software Engineering	100%
17			SER2G1	Data Mining & Warehousing	100%
18			SER2G2	Cloud Computing	100%
19			SER2G3	Simulation and Modeling	100%
20			ASR2S2	Soft Skills -2	100%
21	SCO235	Applied Digital Signal Processing			
22	SCO237	Optimization Algorithms			
23	SCO239	Embedded System Technology			
24	SCO252	Component Technology			
25	SCO253	Object Oriented Design			
26	SCO286	Knowledge Management			
27	SCO288	Bioinformatics Computing			
28	SCO289	Web Application Development			
29	SCO204	Advance Computer Networks			
Average % change in ME program = Total average / 2 =					71%
Average % change =					35.50%

S.V. Zareen
 5-12-18
 Hingiraj
 B. S. V.
 Anshu
 5/12/2018
 Mervin
 Shari

Devi Ahilya University, Indore, India				I Year M.E. (Computer Engineering			
Institute of Engineering & Technology				Sp. in Software Engineering)			
				(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER1C1	L	T	P	L	T	P	Total
Advanced Algorithms	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

Prerequisites: Data Structures and Algorithms.

COURSE CONTENTS

UNIT - I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

UNIT - II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Traveling Salesperson Problem (TSP), etc.
Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

UNIT - III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

UNIT - IV

Introduction to string matching problem, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc. Applications in Bioinformatics. Computational Geometry: Convex Hull. Line-segment Intersection. Sweep Lines. Voronoi Diagrams. Range Trees. Seidel's Low-dimensional LP Algorithm.

UNIT - V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Learning Outcomes:

Upon Completing the Course, Student will have:

1. Skills to analyze algorithms
2. Comparative judgments of different design techniques
3. Ability to solve real world problems
4. Idea about the hardness of some well-known problems including TSP, vertex cover, network flow and combinatorial optimization problems.
5. Familiarity with active research areas in connection with the study of algorithms.

BOOKS RECOMMENDED:

1. T. Cormen, C. Leiserson, R. Rivest, and C. Stein. **Introduction to Algorithms**. (3rd Ed). MIT Press, McGraw-Hill, 2010.
2. M.T. Goodrich, R. Tamassia, "Algorithm design – Foundations, Analysis, and Internet Examples", John Wiley, Second Edition.
3. V. V. Vazirani, **Approximation Algorithms**, Springer. 2001.
4. Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, **Network Flows: Theory, Algorithms, and Applications**,
5. E Horowitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, University Press, 2007.
6. Aho, A V Hopcraft Ullman JD, "The Design and analysis of computer Algorithms", Pearson Education, 2007.

LIST OF PRACTICAL ASSIGNMENTS:

Practical assignments will be based on:

1. Performance analysis
2. Solving problems using design techniques discussed
3. Solution of network flow problems
4. Approximation algorithms
5. String matching algorithms
6. Combinatorial optimization problems
7. TSP problem
8. solving some real world problems using the skill gained in the course
9. study of NP-Complete, NP-Hard problems
10. Any other emerging/ active research problems in the area in consultation with the instructor.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
SE1C2 Object Oriented Analysis and Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course offers the opportunity to students to become skilled at the object oriented analysis and design. This is essential as it is the core of the software development process. This course shall help the student to comprehend the principles of object orientation and apply them as the solution for the real life problems in the form of object oriented design. At the end of the course the students shall be able to design a solution which works and solves software development problems.

Pre requisites:

1. Programming knowledge in any of the object oriented languages like C++, Java.
2. Familiarity and ease with data structures.

Unit I: Introduction to Modelling and UML 2.X

Importance of Modelling, Principles of Modelling, Object Oriented Modelling, Conceptual model of the UML, Architecture, **Software Development Life Cycle**

Unit 2: Basic and Advanced Structural Modelling

Basic Structural Modelling: Classes, Relationships, Common Mechanisms and Diagrams.

Advanced Structural Modelling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages

Unit 3: Class & Object Diagrams

Class & Object Diagrams: Terms, Concepts, Modelling Techniques for Class and Object Diagrams

Unit 4: Basic Behavioural Modelling Interactions, Interaction diagrams, Use cases, Use case

Diagrams, Activity Diagrams, Events and Signals, State Machines, Processes and Threads, Time and Space Diagram, State Chart Diagrams

Unit 5: Architectural Modelling

Architectural Modelling: Component, Deployment, Component Diagrams and Deployment Diagrams, Case Study, Issues in OO Testing

TEXT BOOKS:

[1] Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.

[2] Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modelling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3. Atul Kahate Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO202/ 5CO232 OBJECT ORIENTED ANALYSIS AND MODELING**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
	L	T	P	TH	CW	SW	PR	Total	
5CO202/5CO232 Object Oriented Analysis and Modeling									
Duration of Paper: 3 Hrs.	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Objective:

To be able to analyze the system/ application to be developed; and to be ready to design and implement the software systems from industry perspective.

Prerequisites:

Preliminary Object Oriented Concepts.

CONTENTS

UNIT-I

~~Software Engineering Best practices; Unified Process: Workflow and Lifecycle; Modeling~~

UNIT-II

~~Object Orientation and Mechanisms; Requirements Management; Creating Artifacts; SRS; Use Case Models, Supplementary Specifications~~

UNIT-III

~~Use Case Analysis, Responsibilities, Attributes and Associations~~

UNIT-IV

Analysis and Design Overview; Architectural Analysis.

UNIT-V

Unified Modeling Language, Structural, Behavioral, Architectural Modeling, ~~UML Diagram and Tools.~~

BOOKS RECOMMENDED

- [1] P.Kruchten, The Rational Unified Process: An Introduction, Pearson Education Asia, 2000.
- [2] G. Booch, I. Jacobson, J. Rumbaugh, The Unified Modeling Language- User's Guide, Addison Wesley, 1999.
- [3] W. Boggs and M. Boggs, Mastering UML with Rational Rose, BPB Publication, 1999.
- [4] G.Booch, Object-oriented Analysis and Design with Applications, Addison Wesley, 1994.
- [5] M.Blaha, J.Rambaugh, Object-Oriented Modeling and Design with UML, Pearson Education 2nd edition, 2007.
- [6] www.sdmagazine.com, www.rational.com

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER1C3	L	T	P	L	T	P	Total
Software Construction	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To gain the knowledge for advance programming using JAVA

UNIT I

Object Oriented Concepts, Merits of Object Oriented Technology. Introduction to JAVA and its applications on the Internet. Constructors & constructor overloading, Access modifiers: Class attributes and methods. **Introduction to object model of software development.**

UNIT II

Introduction to Java classes and objects, Java features, data types data type conversions & control statements Operators and their precedence. Introduction to Class, Instance members and member functions.

UNIT III

String Handling, Wrapper classes Arrays and Vectors Inheritance and Polymorphism

Class relationships Inheritance and its types Merits and Demerits of Inheritance Introduction to Association, inheritance Polymorphism Dynamic method dispatch Runtime polymorphism Abstract classes, Interfaces packages

UNIT IV

Java I/O, Basic concept I/O stream reader-writer Exceptions: Need for exceptions Checked exceptions Unchecked exceptions Creating exceptions Multithreading Introduction, Priorities and scheduling of Threads Thread Synchronization and its life cycle Applet and its Life Cycle

UNIT V

Server side programming:- Java servlets, Java Server pages, Web application development using Java, **Database handling with Java.**

Text Books:

T1: Herbert Schildt, Java: The Complete Reference, 8th Edition

T2: Programming with java by e balagurusamy

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO203/ 5CO233 - SOFTWARE CONSTRUCTION**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO203/5CO233 Software Construction	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Objective:

To enhance the programming and coding skills at a professional level and be able to develop the useful programs.

Prerequisites:

Basic knowledge of problem solving and programming fundamentals.

CONTENTS

UNIT I

Introduction:- Introduction to software construction and Java programming language. Importance of Java to the Internet, ~~Java buzzwords, overview of Java, data types, variables and arrays, operators and control statements, Data structures~~

UNIT II

Introducing classes and methods, overloading methods, argument passing, nested and Inner class, Inheritance, multilevel hierarchy, abstract classes, Packages and interfaces.

UNIT III

Exception handling, Multithreaded programming- Java thread model, Thread priorities, synchronization, interthread communication.

UNITIV

Input/Output, java I/O classes and interfaces, streams classes, Serialization, Networking, Java and Net, Applet basics and architecture, passing parameters to the applet, event handling.

UNIT V

Server side programming, Java servlets, servlet chaining, server side include, session tracking, JSP, scripting, ~~Jar files and web application development, Connectivity and SQL~~, JDBC, Java Beans; J2EE Overview- EJBs;

BOOKS RECOMMENDED

- [1] C.S.Horstmann and G. Cornell, Core Java-I: Fundamentals, Sun Microsystems Press, 1999 (Pearson Asia,2000).
- [2] C.S.Horstmann and G. Cornell, Core Java-II: Advanced, Sun Microsystems Press, 2000 (Pearson Asia,2000).
- [3] Ivor Horton, Beginning Java 2 JDK 1.3 Edition, WROX (Shroff Pub.)2000.

- [4] P. Naughton and H.Schildt, Java 2 Complete Reference, Tata McGrawHill,1999.
- [5] S. McConnell, Code Complete, Microsoft Press, 1993 (or latestavailable).
- [6] Latest white paper from the relevantwebsites.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering)			
Subject Code & Name	Instructions Hours per			(Full Time)			
	Week			Credits			
SER1E1 DATABASE ENGINEERING	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

- To understand how transactions are executed and concurrency mechanisms are used in practice.
- To understand how DBMS process queries and how it estimates the cost of query optimization.
- To understand how DBMS maintains data records and access paths.
- To understand the need and use of distributed database systems in practice.
- To familiarize with the emerging technologies of databases.

Prerequisites: Introductory knowledge of Database Systems.

COURSE CONTENTS

Unit-I

Transaction Processing & Concurrency Control: Introduction to Transaction Processing, Transaction Properties, Transaction recoverability and serializability, Transaction Support in SQL, Introduction to Concurrency Control, Two-phase locking, Timestamp ordering, Validation and other issues.

Unit-II

Query Processing & Optimization: Introduction, Translating SQL queries, Algorithms – External Sorting, Select, Join and Project operations, Aggregate and Outer Joins, Heuristics for Query optimization, Estimating cost in query optimization, Semantic optimization, Optimization used in practice.

Unit-III

Data Storage and Querying: File organization, Organization of records, Indexing and Hashing – Basic concepts, B+-tree index files, Static and dynamic hashing, comparison of indexing and hashing etc.

Unit-IV

Distributed Databases : Concepts, Techniques for Distributed database design – Data fragmentation, replication, and allocation techniques; Types of Distributed Systems, Query processing in Distributed Databases, Concurrency control & Recovery in Distributed Databases, Distributed Databases in MySQL.

Unit-V

Advance Topics: Information Retrieval and XML data, Spatial data management, NoSQL – Differences from Relational Databases, Theory, Key-Value Databases, Graph Databases etc.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
3. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO254/ 5CO283 – DATABASE ENGINEERING**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO254/5CO283 Database Engineering Duration of Paper: 3 Hrs.	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Section 1.01

Objective: This course will help the students to acquire the foundation of Database Management systems. It includes concepts relating to various advanced database models, and concepts like database mining and warehousing. This course also describes in major details about the foundation of relational database management systems. Thus, this is an advanced course, which will further develop the knowledge and skill acquired by the students at the basic level.

Prerequisites:

Preliminary Database Concepts.

CONTENTS

UNIT 1:

~~The Relational model, relations, relational operators, relational algebra and calculus, embedded SQL, storage structures in databases, advanced concepts of Entity relationship model.~~

UNIT 2:

~~Relational Database Design, Functional Dependency, Multi-valued dependency, Theory of Normalisation, Query Processing, Concurrency management, Recovery Management, Database Security management.~~

UNIT 3:

~~Advanced Data Models, Client-Server database model, Distributed database model, Database servers and Application servers, Object Oriented Data Model.~~

UNIT 4:

~~Knowledge Databases, Multimedia Databases, Geographical databases, webs database, Mobility and Personal Databases, Database as Backend to web Tools, ODBC, JDBC.~~

UNIT 5:

~~Data Warehousing: Concepts and Applications, Data Mining, Future trends etc. Architecture of advanced DBMS~~

BOOKS RECOMMENDED

1. Elmasri and Navathe, Fundamentals of Database Systems [4e], Pearson Education
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems [3e], McGraw-Hill
3. Korth, Silberchatz, Sudarshan, Database System Concepts, McGraw-Hill.
4. Peter Rob and Coronel, Database Systems, Design, Implementation and Management, Thomson Learning.
5. C.J.Date, Longman, Introduction To Database Systems, Pearson Education.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SER1G1	L	T	P	L	T	P	Total
Soft Computing	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To familiarize with neural networks and learning methods for neural networks.
2. To introduce basics of genetic algorithms and their applications in optimization and planning.
3. To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
4. To develop skills thorough understanding of the theoretical and practical aspects of Soft Computing.

Pre requisites: Analysis of Algorithm, Artificial Intelligence.

COURSE CONTENTS

UNIT-I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing ,Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

UNIT-II

NEURAL NETWORKS

Backpropagation Networks, Architecture: perceptron model, single layer artificial neural network, multilayer perception model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

UNIT-III

GENETIC ALGORITHMS

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems. Simulated annealing

and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

UNIT-IV

FUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfication&Defuzzificataions, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-V

NEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification , Neuro Fuzzy Control , Case studies.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply neural networks to pattern classification and regression problems
3. Recognize the feasibility of applying a soft computing methodology for a particular problem
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problems.

BOOKS RECOMMENDED:

[1] S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.

[2] Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.

[3] Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence - Bart Kosko, Prentice Hall, 1992.

[4] Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.

[5] David E. Goldberg, “Genetic Algorithms in search, Optimization & Machine Learning” ,Addison-Wesley, 1997.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR1S1: Soft Skill-1	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [3] Kumar Mahi. Stress Coping Skills Ebook, [Health & Medicine, Technology](#), 2009.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2C1	L	T	P	L	T	P	Total
Software Project Planning and Management	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course provides the knowledge for correct software development life cycle, create realistic project plans, and manage a software development team through each phase of the project.

The purpose of software project planning and management is to forecast many hazards and risks and problems as possible. The student shall be to plan, organize and control activities so that the project is completed as successfully as possible in spite of all the risks.

Pre-requisites:

A course on software engineering and practical experience of handling college projects.

COURSE CONTENTS

UNIT-I:Introduction to Software Project Management

Project Definition, Contract Management, Activities Covered by Software ProjectManagement, **Overview of Project Planning, Stepwise Project Planning**

UNIT-II:Project Evaluation

Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash FlowForecasting, Cost Benefit Evaluation Techniques, Risk Evaluation

UNIT-III:Activity Planning

Objectives, Project Schedule, Sequencing and Scheduling Activities, NetworkPlanning Models, Forward Pass, Backward Pass , Activity Float, Shortening ProjectDuration , Activity on Arrow Networks , Risk Management , Nature of Risk , Types ofRisk , Managing Risk , Hazard Identification , Hazard Analysis , Risk Planning andControl.

UNIT-IV:Monitoring and Control

Creating Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Managing Contracts, Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management , Acceptance.

UNIT-V:Managing People and Organizing Teams

Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation,The Oldman, Hackman Job Characteristics Model, Working In Groups, Becominga Team, **Decision Making, Leadership, Organizational Structures, Stress, Healthand safety, case studies.**

Text Books:

1. Bob Hughes, Mikecoterrell, “Software Project Management”, Third Edition, Tata McGraw Hill, 2004.

REFERENCE Books

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

Learning Outcomes:

The aim of the course is to help the student to be a responsible member of the software development team. The student after completion of the course shall be able to comprehend project problems and apply the knowledge on projects and software development. The student also shall be aware of the conditions and constraints such as resources, time, cost and quality.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN
SOFTWARE ENGINEERING**

5CO255/5CO285 PROJECT MANAGEMENT

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO255/5CO285 Project Management	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	MAX	100	50	-	-	150
				MIN	50	25			75

Objective:To develop a managerial skill for producing good quality software project and to provide a complete view of project development Life cycle.

CONTENTS

Unit I

Projects and Products: Nature; Initiatives; Process; Product; Resources;

UNIT II

~~Project Lifecycle: Time & Cost Estimating; Design; Planning Techniques; Risk Analysis;~~

UNIT III

Project Management Tools: Execution; Measurement; Reporting; Change and Configuration Management; Implementation issues & Integration Quality Management;

UNIT IV

People Management: Task Allocation; Team Management; Leadership; Multiple Project Coordination;

UNIT V

Development Management: Program Management, Project Documentation, Communication Issues

BOOKS RECOMMENDED

1. G. McLeod; Managing IT Projects; Course Tech.; 1996.
2. F.P. Brooks Jr. The Mythical Man – month; Addison Wesley; 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2C2 Design Pattern	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: To strengthen the knowledge of Object Oriented Design and Development by understanding various design patterns.

Pre requisites: Knowledge of object oriented system concepts, object oriented analysis and modeling and object oriented programming.

COURSE CONTENTS

UNIT-I

Introduction to Software Patterns, Overview of UML, Class Diagrams, Collaboration Diagrams, State chart Diagram, Deployment Diagram, Fundamental Design Patterns: Delegation, Interface, Abstract Super-class, Interface and Abstract class, Immutable, Marker Interface.

UNIT-II

Simple Factory pattern, Factory Method, Abstract Factory, Builder, Prototype, Singleton

UNIT-III

Adaptor, Bridge, Composite, Façade, Flyweight, Decorator, Proxy Pattern

UNIT-IV

Chain of Responsibility, Command, Interpreter, Mediator, Memento Pattern

UNIT-V

Observer, State, Strategy, Template Method, Visitor, Iterator Pattern.

Learning Outcomes: To learn Various Design Patterns and learn their application in real software development..

BOOKS RECOMMENDED:

[1]. Gamma, Helm, Johnson, Vlissides, Design Patterns. Elements of Reusable Software., Pearson Education 2006

- [2]. Cooper, J. W., Java Design Patterns, A Tutorial, Pearson Education, 2000.
- [3]. Freeman, Freeman, Head First Design Patterns, O'Reilly Pub. 2007
- [4]. Mark Grand, Patterns in Java Vol. 1, Wiley 2002
- [5]. Mark Grand, Patterns in Java Vol. 2, Wiley 2002
- [6]. Mark Grand, Patterns in Java Vol. 3, Wiley 2002
- [7]. Douglas Schmidt, Pattern Oriented Software Architecture Vol1, John Wiley 2000, also called as **POSA**

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO251/5CO281 – DESIGN PATTERNS**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5CO251/5CO281 - Design Patterns Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective:

To strengthen the knowledge of Object Oriented Design and Development by understanding various design patterns.

Prerequisites:

Knowledge of object oriented system concepts, object oriented analysis and modeling and object oriented programming.

CONTENTS

UNIT I

Introduction to Software Patterns, Overview of UML, Class Diagrams, Collaboration Diagrams, State chart Diagram, Deployment Diagram, Fundamental Design Patterns: Delegation, Interface, Abstract Super-class, Interface and Abstract class, Immutable, Marker Interface

UNIT II

Simple Factory pattern, Factory Method, Abstract Factory, Builder, Prototype, Singleton

UNIT III

Adaptor, Bridge, Composite, Façade, Flyweight, Decorator, Proxy Pattern

UNIT IV

Chain of Responsibility, Command, Interpreter, Mediator, Memento Pattern

UNIT V

Observer, State, Strategy, Template Method, Visitor, Iterator Pattern

BOOKS RECOMMENDED

1. Gamma, Helm, Johnson, Vlissides, Design Patterns. Elements of Reusable Software., Pearson Education 2006
2. Cooper, J. W., Java Design Patterns, A Tutorial, Pearson Education, 2000.
3. Freeman, Freeman, Head First Design Patterns, O'Reilly Pub. 2007
4. Mark Grand, Patterns in Java Vol. 1, Wiley 2002
5. Mark Grand, Patterns in Java Vol. 2, Wiley 2002
6. Mark Grand, Patterns in Java Vol. 3, Wiley 2002
7. Douglas Schmidt, Pattern Oriented Software Architecture Vol1, John Wiley 2000, also called as POSA

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2C3 Software Testing & QA	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: To develop a skill in developing good quality in the software product.

Pre requisites: Basic knowledge of software Engineering and programming.

COURSE CONTENTS

UNIT-I

SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics – Various software development Life cycles (SDLC) –Principles of testing.

UNIT-II

WHITE BOX TESTING White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis

UNIT-III

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing- Integration Testing

UNIT-IV

TESTING STRATEGIES: System testing - Functional testing-non-Functional testing-acceptance testing-performance testing –Factors and Methodology for Performance testing, Regression testing-Methodology for Regression-testing.

UNIT-V

ADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING): Syntax testing - Finite state testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

Learning Outcomes: To learn to Software Testing & QA concepts and its approaches to software Testing and QA.

BOOKS RECOMMENDED:

- [1]. Srinivasan Desikan&Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education, 2006
- [2]. R. Patton; Software Testing; Techmedia (SAMS) 2000
- [3]. GlenfordJ.Myers, " The Art of Software Testing ", John Wiley & Sons, 1979.
- [4]. Boris Beizer, Black-Box Testing: “Techniques for Functional Testing of Software and Systems ", John Wiley & Sons, 1995.
- [5]. P.C.Jorgensen, “Software Testing - A Craftsman’s Approach ", CRC Press, 1995.
- [6]. Robert V.Binder, " Testing Object-Oriented Systems: Models Patterns and Tools ", Addison Wesley, 2000.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN
SOFTWARE ENGINEERING
5CO257/5CO287 - SOFTWARE TESTING & QUALITY ASSURANCE**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5C0257/5CO287 SOFTWARE TESTING & QUALITY ASSURANCE	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective: To develop a skill in developing good quality in the software product.

UNIT I:

SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics – Various software development Life cycles (SDLC) –Principles of testing.

UNIT II:

WHITE BOX TESTING: White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis

UNIT III:

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing- Integration Testing.

UNIT IV:

TESTING STRATEGIES: System testing - Functional testing-non-Functional testing-acceptance testing- performance testing –Factors and Methodology for Performance testing, Regression testing-Methodology for Regression testing.

UNIT V:

ADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING):

Syntax testing - Finite state testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

BOOKS RECOMMENDED

1. Srinivasan Desikan & Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education,2006
2. R. Patton; Software Testing; Techmedia (SAMS)2000.
3. Glenford J.Myers, " The Art of Software Testing ", John Wiley & Sons,1979.
4. Boris Beizer, Black-Box Testing: " Techniques for Functional Testing of Software and Systems ",John Wiley & Sons,1995.
5. P.C.Jorgensen, " Software Testing - A Craftman's Approach ", CRC Press,1995.
- 6.Robert V.Binder, " Testing Object-Oriented Systems: Models Patterns and Tools ", Addison Wesley,2000.

Devi Ahilya University, Indore, India				II Year M.E. (Computer Engineering Sp. in Software Engineering)			
Institute of Engineering & Technology				(Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2E1	L	T	P	L	T	P	Total
Speech andLanguageProcessing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Prerequisite: Discrete structures, Finite automata, information retrieval and Context-free Grammar

COURSE CONTENTS

UNIT I

Natural Language Processing, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNIT II

Computational Phonology: speech sound, phonetic transcription, text to speech; Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-grams.

UNIT III

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNIT IV

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. **Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, WordNet.**

UNIT V

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

TEXTBOOKS:

- [1] D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.
- [2] 2. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",
- [3] James Allen. "Natural Language Understanding", Addison Wesley, 1994.

List of Assignment in NLP Lab:

Problem based on Stemming Algorithm.

Problem based on Part of Tagging.

Problem based on Parsing.

Problem based on Information Retrieval.

Case study on Different NLP Techniques

Cricket Game Prediction.

Machine Translation from English-Hindi.

Query Expansion for Information Retrieval.

Emotion detection for texts.

Any other problem based on emerging trends in speech & language processing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5CO206/5CO236 Speech and Language Processing									
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective:

To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Prerequisite:

Discrete structures, Finite automata, Context-free Grammar

CONTENTS

UNIT I:

Natural Language Processing, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNIT II:

Computational Phonology: speech sound, phonetic transcription, text to speech; Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-Grams for spelling and pronunciation.

UNIT III:

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNIT IV:

Syntax Processing: Parsing with CFG, Earley Parsing, Probabilistic Parsing, CYK algorithm; Semantic Processing: Meaning representation, First Order Predicate Calculus, ~~Semantic augmentation of CFG rules~~, Semantic grammar, ~~Idioms and compositionality~~.

UNIT V:

Lexical Semantics: Internal structure of words, Thematic roles, ~~Primitive decomposition~~, Word Net; Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

BOOKS RECOMMENDED

- [1] D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.
- [2] J. Allen, Natural Language Understanding; Benjamin Cummings; 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2E3	L	T	P	L	T	P	Total
Machine Learning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, **Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses.** Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: **Classification and Regression learning methods,** Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. **Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.**

Unit-III

Unsupervised Learning: **Introduction to unsupervised learning -Clustering -Classification of clustering algorithms: K-Means and EM -Factor Analysis: PCA (Principal Components Analysis) and ICA (Independent Component Analysis) -Self-Organized Maps (SOM) and Multi-dimensional Scaling.**

Unit-IV

Computational Learning theory, Introduction, PAC Learning, **VC dimension, Support Vector Machines (SVM),** Genetic Algorithm (GA), illustrative examples for SVM and GA.

Unit-V

Artificial Neural Networks Learning, Introduction, Neural Network Representation, Perceptron, Backpropagation algorithm, Examples of Neural Network Learning.

RECOMMENDED BOOKS

- [1] Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- [2] Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- [3] Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- [4] David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

Problem based on different machine Learning algorithm

Works on different machine learning Tools

Case Study on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO208/5CO238 Machine Learning	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective: To expose the students about automatic machine learning methodologies.

Prerequisite:

Computer Themes; Formal Language & Automata.

CONTENTS

UNIT-I

~~Introduction: Theoretical Approaches: Inductive Inference; Grammatical Inference; PAC Learning; Complexity of learning; Polynomial learn ability; VC-dimension~~

UNIT-II

~~Methodologies: Parametric Learning; Language learning; Explanation based learning; Learning using exemplars; Genetic algorithms; Learning in neural nets; Multi-strategy learning~~

UNIT-III

~~Automatic program construction from example computations; Inference of LISP and logic programs; Inference of decision trees and finite automata~~

UNIT-IV

~~Architecture of machine learning programs; ID5; C4.5 etc.~~

UNIT-V

Application of Machine learning to Data Mining and Knowledge Discovery.

BOOKS RECOMMENDED

- [1] Anthony M. and Biggs N.; Computational learning theory; Cambridge Univ. Pr. 1992.
- [2] Michalewicz Z.; Genetic Algorithms + Data Structures = Logic Programs; Springer; 1992.
- [3] Bergadano F. and Gunetti D.; Inductive Logic Programming; MIT Press; 1996.
- [4] Goldberg D.E.; Genetic Algorithms in Search; Optimization and Machine Learning; Addison- Wesley; 1989.
- [5] Ross Q.J.; C4.5; Programs for Machine Learning; Morgan Kaufmann; 1997.
- [6] U.M. Fayyad et. Al.; Knowledge Discovery and Data Mining; MIT Press; 1996.
- [7] Nilsson N J, Introduction to Machine Learning, eBook, 1996.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SER2G1	L	T	P	L	T	P	Total
Data Mining & Warehousing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives:

- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models.

Unit-I

Data Mining -Introduction: Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Knowledge Discovery in Databases (KDD), KDD Process, Data Preprocessing, Data Cleaning, Data Transformation, Data Compression and Dimension Reduction, Principal Component Analysis, Binning Methods.

Unit-II

Data Warehousing –Introduction and Design: Overview and Concepts: Need for data warehousing, basic elements of data warehousing, Architecture and Infrastructure: Architectural components, Infrastructure and metadata. Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling, data extraction, transformation and loading, data quality. OLAP in data warehouse –ROLAP, MOLAP, HOLAP. OLTP Vs OLAP, Various Data Warehouse Schemas.

UNIT-III

Association & Classification Techniques: Introduction, Frequent itemset mining methods – Apriori, FP-Growth, Pattern evaluation methods, Basic concepts of classification, Decision tree induction, Bayes classification, Rule-based classification.

UNIT-IV

Clustering Techniques: Introduction, Clustering paradigms; Partitioning algorithms – K-Means, K-Medoid, CLARA; Partition based clustering – BIRCH; Density based clustering - DBSCAN; Categorical clustering algorithms, Evaluation of Clustering.

UNIT-V

Other DM techniques & Web Mining: Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends. Web Mining : Introduction Web content mining, Web structure Mining, Web Usage Mining.

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis.

Reference Books:

1. Data Mining Techniques; ArunK.Pujari ; University Press.
2. Data Mining Concepts and Techniques, Jiawei Han Micheline Kamber,Jianpei, Morgan Kaufmann.
3. Data Mining; Adriaans&Zantinge; Pearson education.
4. Mastering Data Mining; Berry Linoff; Wiley.
5. PaulrajPonniah, “Data Warehousing Fundamentals”, John Wiley.
6. Text Mining Applications, Konchandy, Cengage

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR2S2: Soft Skill-2	L	T	P	L	T	P	Total
		2	-	-	2	-	-
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede's Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
- [3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

[5] Ramneek Kapoor, Managerial Skills, Pathmaker Bangalore, Nakoda Publishers & Printers, 1st Ed.

[6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year Information Technology (Sp. Information Security) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credits			
ISR1C1: Advanced Algorithms	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

COURSE CONTENT

Unit I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

Unit II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Travelling Salesperson Problem (TSP), etc. Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

Unit III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

Unit IV

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

Unit V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Learning Outcomes: Students will be able to:

- Learn about advance problem solving techniques
- Acquire knowledge about current topics of research in Algorithm design
- Apply knowledge in problem solving.

Text and Reference books:

- [1] T. Cormen, C. Leiserson, R. Rivest, and C. Stein. Introduction to Algorithms. (3rd Ed). MIT Press, McGraw-Hill, 2010.
- [2] M.T. Goodrich, R. Tamassia, “Algorithm design – Foundations, Analysis, and Internet Examples”, John Wiley, Second Edition.
- [3] V. V. Vazirani, Approximation Algorithms, Springer. 2001.
- [4] Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, Network Flows: Theory, Algorithms, and Applications,
- [5] E Horowitz, S salmi, S Rajasekaran, “Fundamentals of Computer Algorithms”, Second Edition, University Press, 2007.
- [6] Aho, A V Hopcraft Ullman JD, “The Design and analysis of computer Algorithms”, Pearson Education, 2007.

Institute of Engineering & Technology				(Sp. Information Security) SEMESTE R I					
Subject Code & Name	Instructions Hours per Week			Marks					
5IT403/5IT433 Secure Computing Techniques	L	T	P		TH	CW	SW	PR	Total
		3	1	2	Max	100	50	50	50
Duration of paper: 3 hrs				Min	50	25	25	25	125

Objective: To enhance the programming and coding skills at a professional level and to be able to develop the useful programs.

Prerequisites: Basic knowledge of problem solving on computers and programming fundamentals.

COURSE CONTENTS

UNIT I

~~Introduction to software construction and Java programming language. Importance of Java to the Internet, Java buzzwords, overview of Java, data types, variables and arrays, operators and control statements, Data structures~~

UNIT II

~~Introducing classes and methods, overloading methods, argument passing, nested and Inner class, Inheritance, multilevel hierarchy, abstract classes, Packages and interfaces.~~

UNIT III

~~Exception handling, Multithreaded programming Java thread model, Thread priorities, synchronization, interthread communication.~~

UNIT IV

~~Input/Output, java I/O classes and interfaces, streams classes, Serialization, Networking, Java and Net, Applet basics and architecture, passing parameters to the applet, event handling.~~

UNIT V

~~Server side programming, Java servlets, servlet chaining, server side include, session tracking, JSP, scripting, Jar files and web application development, Connectivity and SQL, JDBC, Java Beans; J2EE Overview EJBs;~~

Books Recommended:

- 1) C.S.Horstmann and G. Cornell, Core Java-I: Fundamentals, Sun Microsystems Press, 1999 (Pearson Asia, 2000).
- 2) C.S.Horstmann and G. Cornell, Core Java-II: Advanced, Sun Microsystems Press, 2000 (Pearson Asia, 2000).
- 3) Ivor Horton, Beginning Java 2 JDK 1.3 Edition, WROX (Shroff Pub.) 2000.
- 4) P. Naughton and H.Schildt, Java 2 Complete Reference, Tata McGrawHill, 1999.
- 5) S. McConnell, Code Complete, Microsoft Press, 1993 (or latest available).
- 6) Latest white paper from the relevant websites.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME I Year Information Technology (Sp. Information Security) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credits			
ISR1C2: Secure Computing Techniques	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objective:

This course aims to provide an understanding of the various security attacks and knowledge to recognize and remove common coding errors that lead to vulnerabilities. It gives an outline of the techniques for developing a secure application.

COURSE CONTENT

Unit-I: Introduction

Security: CIA (AIC) Triad, Viruses, Trojans, and Worms In a Nutshell, Security Concepts- exploit, threat, vulnerability, risk, attack. *Malware Terminology:* Rootkits, Trapdoors, Botnets, Key loggers, Honeypots. Active and Passive Security Attacks, IP Spoofing, Tear drop, DoS, DDoS, XSS, SQL injection, Smurf, Man in middle, Format String attack. *Types of Security Vulnerabilities:* buffer overflows, invalidated input, race conditions, access-control problems, weaknesses in authentication, authorization, or cryptographic practices. Access Control Problems.

Unit-II: Secure Software Development Cycle & Threat Modelling

Need for Secure Systems: Proactive Security development process, Secure Software Development Cycle (S-SDLC) , Security issues while writing SRS, Design phase security, Development Phase, Test Phase, Maintenance Phase, Writing Secure Code – Best Practices SD3 (Secure by design, default and deployment), Security principles and Secure Product Development Timeline. Identifying the Threats by Using Attack Trees and rating threats using DREAD, Risk Mitigation Techniques and Security Best Practices. Security techniques, authentication, authorization. Defence in Depth and Principle of Least Privilege.

Unit – III: Secure Coding Techniques

Protection against DoS attacks, Application Failure Attacks, CPU Starvation Attacks, *Insecure Coding Practices in Java Technology:* ARP Spoofing and its countermeasures. Buffer Overrun- Stack overrun, Heap Overrun, Array Indexing Errors, FormatString Bugs. *Security Issues in C/C++ Language:* String Handling, Avoiding Integer Overflows and Underflows and Type Conversion Issues- Memory Management Issues, Code Injection Attacks, Canary based countermeasures using StackGuard and Propolice. Socket Security, Avoiding Server Hijacking, Securing RPC, ActiveX and DCOM. Secure coding issues in Android Applications, Language Specific issues like C/C++, Perl, Python, Scripting Languages, Ada, Java, PHP etc.

Unit – IV: Database and Web-specific issues

SQL Injection Techniques and Remedies, Race conditions, Time of Check Versus Time of Use and its protection mechanisms. Validating Input and Interprocess Communication, Securing Signal Handlers and File Operations. XSS scripting attack and its types – Persistent and Non persistent attack XSS Countermeasures and Bypassing the XSS Filters.

Unit – V: Testing Secure Applications

Security code overview, secure software installation. The Role of the Security Tester, Building the Security Test Plan. Testing HTTP-Based Applications, Testing File-Based Applications, Testing Clients with Rogue Servers.

After the completion of course student will :

- Learn various security attacks
- Acquire knowledge of common coding errors that lead to vulnerability
- Learn techniques of developing secure applications

Text and Reference books:

[1] Writing Secure Code, Michael Howard and David LeBlanc, Microsoft Press, 2nd Edition, 2004

[2] Buffer Overflow Attacks: Detect, Exploit, Prevent by Jason Decker, Syngress, 1st Edition, 2005

- [3] Threat Modeling, Frank Swiderski and Window Snyder, Microsoft Professional, 1st Edition, 2004.
- [4] Secure Programming HOWTO by David A. Wheeler
- [5] Secure Coding: Principles & Practices by Mark G. Graff, Kenneth R. van Wyk

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) SEMESTER I						
Subject Code & Name		Instructions Hours per Week			Marks					
5IT404/5IT434 Advance Computer Networks		L	T	P		TH	CW	SW	PR	Total
		3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs					Min	50	25	25	25	125

Objective: To develop the skills of designing, implementing network.

Prerequisites: NIL

COURSE CONTENTS

UNIT I

Network overview, review of underlying network technologies, structure of network software in an operating system; internetworking concept and architectural model,, classful internet addresses, mapping internet addresses to physical addresses (ARP),

Unit II

Internet Protocol-datagram delivery, forwarding IP datagrams, error messaging (ICMP), classless and subnet address extensions (CIDR), Routing architecture cores, peers and algorithms,

Unit III

TCP & UDP protocol implementation, routing architecture, IP switching and MPLS, mobile IP, routing between peers (BGP), routing within autonomous system (OSPF,RIP), ~~Internet Multicasting~~

Unit IV

Private network interconnection (NAT, VPN), Socket interface, Bootstrap and auto configuration (DHCP), Domain Name system, Remote Login (TELNET, SSH),

Unit V

Electronic Mail –SMTP,POP,IMAP, WWW-HTTP, Network Management (SNMP) Voice and Video over IP (RTP), Traffic Scheduling & Policing, QoS, Internet Security and Firewall Design (IPSec, SSL)

Books Recommended:

- 1) Douglas E.Comer Internetworking with TCP/IP Vol. I Principles,Protocols and Architecture, 5nd Edition 2006
- 2) Douglas E. Comer,David L. Stevens; Internetworking with TCP/IP Vol. II design, Implementation of Intranets. PHI, 3rd Edition 2000.
- 3) B. Forouzan, TCP/IP Protocol Suite, McGraw Hill,3/e,2006
- 4) James F. Kurose, Keith W. Ross, "Computer Networking: A Top Down Approach Featuring the Internet", Addison Wesley, July 2002
- 5) S. Tanenbaum; Computer Network; 4th Edition PHI 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR1C3: Advanced Computer Networks	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

Provide students with enhance base of knowledge of Computer Networks, Develop a comprehensive knowledge of Tools and Techniques used in Management of Computer Networks, Develop skills in independent managing Network Performance related issues Develop ability to carry out research in area of Computer Networks.

COURSE CONTENT

Unit I : Foundation

Computer Networks and Internet, Structure of network software in an operating system, Packet Switching and Circuit Switching, Protocols Layers and Network Service Models, Implementing Network Software (Sockets), Network Performance - Delay, Loss, Throughput, and Bandwidth, Best-effort services and QoS guarantees for multimedia data.

Unit II : Link Layer, Access Networks and LANs

Services Provided by Link Layer, Link Layer Implementation, Multiple Access Protocols and Ethernet, Switched Local Area Networks, Link Layer Addressing (ARP), RARP, VLANs, Link Virtualization and MPLS, Data Center Networking

Unit III : Network Layer and Internetworking

Virtual Circuit and Datagram Networks, Internet Protocol, IPV4 -Class full and Classless Addressing, Subnetting, IPV6 Addressing, IP Datagram delivery and forwarding, Routing Algorithms- Distance Vector and RIP, Link State Routing and OSPF, Inter domain Routing - BGP, DHCP, ICMP, Router-switching, input/output processing, Routing Control Plane, Network Virtualization- VPN and NAT.

Unit IV : Transport Layer and End-to-End Protocols

Transport layer services in Internet, Multiplexing and De-multiplexing, Connectionless Transport: UDP segment format and checksum, Connection Oriented Transport: TCP-segment format, roundtrip estimation and Timeout, Reliable data Transfer, Flow control, TCP connection Management, TCP congestion control Additive Increase/Multiplicative Decrease, Slow start, Fast Retransmit and Fast Recovery, Fairness and Queuing Disciplines.

Unit V : Application Layer

Network Application Architecture and Process Communication, Web and HTTP, File Transfer FTP, Electronic Mail- SMTP, POP, IMAP, MIME, Internet Discovery Service-DNS, Network Management – SNMP, Advance topics - Software Defined Networking, Internet of Things

Learning Outcomes: After the completion of course student will:

- Learn Computer Network Protocols in deeper details
- Learn advance topics in computer networks
- Exposed to performance issues in Computer Networks
- Learn about current research topics in Computer Networks

Text and Reference books:

- [1] Computer Networking, A Top-Down Approach, 6th Ed., J. Kurose and K. Ross, Pearson, 2013.
- [2] Computer Networks, A Systems Approach, 5th Edition, L. Peterson and B. Davie, Morgan Kaufman, 2012.
- [3] Internetworking with TCP/IP Volume I, 6th Ed., D. E. Comer, Pearson Education, 2013.
- [4] Internetworking with TCP/IP Volume II, 3rd, Ed., D. E. Comer and David L. Stevens, Pearson Education, 2003.
- [5] Data Communications and Networking, 4th Ed., Beharouz A. Forouzan, McGraw-Hill Education Private Ltd., 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISP1G1: Advanced Database Management Systems	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

To enhance the understanding of practical issues related to advance topics of Database systems.

COURSE CONTENT

Unit I : Introduction to Data Warehousing and Data Mining

Introduction to Knowledge discovery process, OLTP, OLAP, Data Mining: Functionalities, Process, Schemas and Applications etc.; Data Warehouse : Construction and other issues.

Unit II : Transaction Processing and Concurrency Control

Introduction, Properties; Schedules, Types of Schedules, Characterizing Schedules, Serializability, Two-phase locking, Dealing with Deadlock and Starvation, Time Stamp Ordering and Multi version Concurrency control etc.

Unit III : Data Storage, Indexing and Physical Database Design

Types of Files, Introduction to Hashing, Multilevel Indexes, B-trees, B+ -trees, Indexes on Multiple Keys, Overview of Physical Database Design and Database Tuning in Relational Databases

Unit IV : Query Optimization

Introduction to Query Optimization, Overview of algorithms used in External Sorting and other SQL operations, Use of Heuristics, Cost Estimation and Selectivity used in Query Optimization, Semantic Query Optimization etc.

Unit V : Distributed Databases and Security

Concepts, Types and Query Processing in Distributed Databases, Data Fragmentation, Replication and Allocation Techniques, Introduction to Database Security Issues, Access Control Policy, Statistical Database Security etc.

Text and Reference books:

- [1] Fundamentals of Database Systems, Elmasri and Navathe, Pearson Education, 6th Edition, 2014.
- [2] Data Mining Concepts and Techniques, Han and Kamber, Morgan Kauffman, 3rd Edition, India, 2012.
- [3] Database System Concepts, Silberchatz, Korth, Sudarshan, Mcgraw Hill, 6th Edition, 2010.
- [4] Database Systems : A practical Approach to Design, Implementation, and Management, Connolly and Begg, Pearson Education, 6th Edition, 2014.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) SEMESTER I						
Subject Code & Name		Instructions Hours per Week			Marks					
5IT405/5IT435 Data Security		L	T	P		TH	CW	SW	PR	Total
		3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs					Min	50	25	-	-	75

Objective: To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

Pre-requisite: NIL

COURSE CONTENTS

UNIT-I

Classical Cryptography: Introduction, Various types of Cipher, Cryptanalysis Shannon's Theory: Elementary probability theory, Entropy, Product Cryptosystems Block Ciphers and the Advanced Encryption Standard: Introduction, Linear and differential Cryptanalysis, Data encryption standard, Advanced Encryption standard, Modes of operation.

UNIT-II

Cryptographic Hash Functions: Security of Hash functions, Iterated Hash functions, Message Authentication Codes, Unconditionally Secure MACs.

UNIT-III

The RSA Cryptosystem and Factoring Integers: Number Theory, RSA Cryptosystem, Factoring Algorithms, Attacks on RSA, The Rabin Cryptosystem, Semantic Security of RSA.

UNIT-IV

Public key Cryptosystems Based on the Discrete Logarithm Problem: Algorithms for the Discrete Logarithm Problem, Lower bounds on the complexity of generic algorithms, Finite fields, Elliptic curves, security of ElGamal Systems.

UNIT-V

Signature Schemes: Security requirements, ElGamal Signature Scheme, Provably secure Signature Schemes; Undeniable, Fail-stop Signatures

Books Recommended:

- 1) Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC 2nd edition
- 2) Williams Stallings; "Cryptography & Network Security"; Pearson Education 3rd edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR1E1: Data Security	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Foundation

Security Taxonomy, Domain of information security, security goals, security approaches, principles of security, security attacks, threats, vulnerabilities, malicious software's, virus, worms, Trojan, spy wares, Applets/Active X, cookies. Security services, mechanisms and security models. **Types of attacks, packet sniffing, packet spoofing, IP sniffing, IP spoofing, DNS spoofing attack.**

Unit II : Classical Cryptographic Techniques

Cryptography terminologies, classical cryptography: substitution techniques, transposition techniques, playfair cipher, Hill cipher. Mathematics of cryptography: Integer arithmetic, modular arithmetic, Euclid theorem, Concept of symmetric and asymmetric key cryptography, stenography, digital watermarking, key range and size, possible types of attacks. Stream ciphers and Block cipher. Algorithm type and modes. Key distribution, **Diffie Hellman key exchange, Man in the middle attack.**

Unit III : Symmetric Key Algorithms

Computer based symmetric key cryptographic algorithms: Data Encryption Standard (DES), Double DES, meet in the middle attack, Triple DES, **International Data Encryption Algorithm (IDEA), RC5, Blowfish,** Advance Encryption Standard (AES).

Unit IV : Asymmetric Key Algorithms

Random number generation, Prime numbers. Fermat's and Euler's theorem. Principles of public key crypto systems. Computer based asymmetric key cryptographic algorithms: RSA algorithm. Principles of public key cryptosystems, symmetric and asymmetric key cryptography together. Concept of Digital Envelope, Digital signatures, message digests and its requirements.

Unit V : Public Key Crptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). **Problems with the public key exchange.**

Text and Reference books:

- [1] Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC
- [2] Williams Stallings; "Cryptography & Network Security"; Pearson Education.
- [3] Mathew Bishop; Introduction to computer Security; Addison-Wisley
- [4] Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Spl Information Security) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR1S1: Soft Skills-1	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- 1) Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- 2) Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- 3) Kumar Mahi. Stress Coping Skills Ebook, [Health & Medicine, Technology](#), 2009.
- 4) Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- 5) Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) II Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5IT453/5IT483 Information Security Management	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Objective:

To study the methods of managing information systems in a secure way.

Pre-requisite: NIL

COURSE CONTENTS

UNIT-I

Introduction- Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access).

Threats - Viruses ,worms , Trojan horse, bombs, trap doors, spoofs, email virus, macro viruses, remedies, Intruders, Malicious software.

UNIT-II

Communication security- Encryption, Public Key Infrastructure, Digital Signatures.

UNIT-III

User Authentication Mechanisms: Passwords, Authentication tokens, Certificate based Authentication, Single Sign on (SSO), Kerberos, X.509, Cryptographic Solutions- A case study.

UNIT-IV

Internet Security Protocols: Secure Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Secure Electronic Transaction (SET), Electronic Money, Email Security.

UNIT-V

Intrusion detection techniques – Techniques to provide privacy in Internet Application and protecting digital contents(music, vedio, software) from unintended use, authentication.

System and Application Security- IP security, Web security. file System security, program and security, memory security, Sandboxing.

Security threads protection intruders- Viruses-trusted system.

Firewalls, vulnerabilities & threats, Network Denial of service attack, Contract Signing, Secret Splitting.

Books Recommended:

- 1) Dieter Gollman; *Computer Security*; John Wiley & Sons 1999
- 2) Mathew Bishop; *Computer Security*; Art and Science; Addison-Wisley Oct. 2007
- 3) Mathew Bishop; *Introduction to computer Security*; Addison-Wisley Oct 2004
- 4) Kaufman, Perlman and Speciner; “*Network security*”; Pearson Education 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR2C1: Information Security Management	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

To study the methods of managing information systems in a secure way.

COURSE CONTENT

Unit I : Foundation

Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access). Threats - Viruses ,worms , Trojan horse, bombs, trap doors, spoofs, email virus, macro viruses, remedies, Intruders, Malicious software.

Unit II : Communication Security

Encryption, Public Key Infrastructure, Digital Signatures, Digital signatures.

Unit III : User Authentic Mechanisms

Passwords, Authentication tokens, Certificate based Authentication, Single Sign on (SSO), Kerberos, X.509, Cryptographic Solutions- A case study.

Unit IV : Information Security Protocols

Secure Socket Layer (SSL), Secure Hyper Text Transfer Protocol (SHTTP), Secure Electronic Transaction (SET), Electronic Money, Email Security.

Unit V : System and Application Security

Intrusion detection techniques, techniques to provide privacy in Internet Application and protecting digital contents(music, vedio, software) from unintended use, authentication. IP security, Web security. file System security, program and security, memory security, Sandboxing. Security threads protection intruders- Viruses-trusted system. Firewalls, vulnerabilities & threats, Network Denial of service attack, Contract Signing, Secret Splitting.

Text and Reference books:

- [1] Dieter Gollman; Computer Security; John Wiley & Sons 1999
- [2] Mathew Bishop; Computer Security; Art and Science; Addison-Wisley Oct. 2007
- [3] Mathew Bishop; Introduction to computer Security; Addison-Wisley Oct 2004
- [4] Kaufman, Perlman and Speciner; "Network security"; Pearson Education 1995.
- [5] Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) II Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
5IT452/5IT482 Security in e-Commerce Applications	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Objective:

To boost security issues involve in e-Commerce applications.

Pre-requisite: NIL

COURSE CONTENTS

UNIT-I

Introduction to internet business: Defining E-business, E-business categories.
Preparing the online business: Designing, Developing, and Deploying the System.
Selecting the technology: IT infrastructure, choosing the right enterprise applications.

UNIT-II

Legal Issues: Global contracts, Web site domain name battle, National encryption laws, Digital signatures, Digital complaint services, IT act 2000.

UNIT-III

E-business Applications: Searching the internet, Portal sites, the new all in one mega web sites, shopping solutions, Auctions and trading mechanisms, safe exchange, payment mechanisms, Chat solutions.

UNIT-IV

Security on the internet: Creating a security strategy, Applications of cryptography, privacy, fighting virus and hoax virus warnings, conflict in the information age, Client based security, Server based security.

UNIT-V

Paying via internet: Payment business, minimizing the risk, Internet payment models, fraud detection, post payment systems, credit card solutions, internet cheques, debit cards, online experience, electronic cash, smart cards. Biometrics.

Books Recommended:

- 1) Daniel Amor ; “The E-business Evolution” ; Pearson Education Asia 2nd edition

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR2C2: Digital Forensics and Security Audit	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

At the completing of the course, students will be able to understand the fundamental concepts of forensic science and digital forensics principles. Learn to identify importance of digital evidence.

COURSE CONTENT

Unit I : Introduction of Digital Forensics:

Digital crime, current scenario of digital crime in India, Evidence and its role in IT Act, Digital Evidence, Digital Vs Physical Evidence, nature of Digital Evidence, precautions while dealing with Digital Evidence, challenging aspects of Digital Evidence, Digital Devices, evidential potential of digital devices, Digital Forensics, dimensions and principles of Digital Forensics, Digital Forensic Investigation, Investigation Models, Scientific method in Digital Investigation, Research potential and scope in digital forensics.

Unit II : Data and Evidence Recovery:

Seizure of digital information : Issues, methodology, factors limiting wholesale seizure, pulling the plug or not; data objects, Storage Media, Variety of data, Recovered data objects, electronic evidence: secure boot and write blockers, disk file organization ,disk and file imaging; forensic tools, forensic data carving, data recovering techniques.

Unit III : Mobile and Live Forensics Investigations:

Mobile phone forensics: mobile device characteristics, memory considerations, tools classification, flasher boxes, obstructed devices, forensics procedures: preservation, acquisition, examination and analysis, reporting; SIM Card Forensics.
Network Forensics: sources of network based evidences, procedure for applying network based forensics, digital evidence on internet, digital evidence on physical and data link layers, digital evidence at the network and transport layers.

Unit IV : Security Issues and Principles:

Risk Analysis: Terms and Definitions, Need, Methodology, Considerations and Approaches.
Security Models: IA-CMM,ISM3, SSE-CMM: Importance, Usage, Structure and Architecture, Process Areas; Security Engineering and its need.
Security Standards and frameworks: ISO 27001: Evolution, Organizational Context, ISMS Implementation in Organizations; COBIT: Principles, Structure and Objectives.
Security Methodologies: IAM, IEM, OCTAVE, OSSTMM,SIPES.
Laws for Information Security: Introduction to The Indian IT Act, IPR, Patent law, Copyright Law.

Unit V : Security Audit/Assurance:

Security Audits : Need in Organizations, Auditor's responsibility, Types, Approaches, Technology- Based Audits : Penetration Testing and Vulnerability Scanning; Phases, Budgeting for Security Audits.
Privacy : Organizational implications, Practices ,Policy, Audits: Framework and Approach, Standards, Phases, Process : Design, Risk Analysis, Planning, Conducting, Reporting.

Text and Reference books:

- [1] Nina Godbole, Information Systems Security-Security Management, Metrics, Frameworks and Best Practices, Wiley, 2009.
- [2] Digital Forensics and Cyber Crime; Ibrahim Baggili; Springer.
- [3] W. Kruse and J. Heiser, *Computer Forensics: Incident Response Essentials*, Massachusetts, Ed. Boston: Addison Wesley, 2001.
- [4] Rick Ayers, Sam Brothers and Wayne Jansen : Guidelines on Mobile Device Forensics, NIST, 14.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) II Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
5IT454/5IT484 Secure Wireless Networks	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Objective: To study the methods of managing wireless systems in a secure way.

Pre-requisite: NIL

COURSE CONTENTS

UNIT-I

~~Challenges to Wireless Networks and Wireless Security : Properties of Ad hoc Networks, Challenges to Wireless networks like Constrained resources, Mobility, Security, Traditional Security issues, Mobile and Wireless Security issues, Problems in Ad hoc Networks, Types of Attacks, Different approaches for providing Security.~~

UNIT-II

Security in Local Area Networks: Introduction to WLAN, Advantages, 802.11 Standard, WLAN Architecture, Protocols, Security in WLANs, Wireless Alphabet Soup, Wired Equipment Privacy, WPA, 802.11 Encryption Protocols.

UNIT-III

Security in Wide Area Networks: Introduction to Global System for Mobile Communication, GSM Architecture, Call routing, Hand-off, Frequency Allocation, GSM Authentication and Encryption. CDMA, Spread Spectrum Technique, CDMA v/s GSM, Security in CDMA.

UNIT-IV

Security in Metropolitan Area Networks: Introduction to Wi-max, Advantages, IEEE 802.16 Standard, Architecture, Protocols, 802.16 Security, Problems and Limitations.

UNIT-V

Security in Personal Area Networks: Introduction to Bluetooth, it's Specifications, Bluetooth Architecture, Bluetooth security models, Basic Security Mechanisms, Encryption, Authentication, Limitations and Problems.

Books Recommended:

- 1) F. Adelstein, S. Gupta, G. G. Richard, L. Schwiebert, "Fundamentals of Mobile and Pervasive Computing" TMH Publications, TMH edition, 2005.
- 2) A. K. Talukder, R. R. Yavagal, "Mobile Computing" TMH Publications, 2005.
- 3) G. S. Rogers, J. Edwards, "An Introduction to Wireless Technology" Pearson Education, First Impression 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR2C3: Secure Wireless Networks	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

- 7) Provide students with enhance base of knowledge of wireless networking.
- 8) Learn Security Issues in different wireless networks and mitigation techniques
- 9) Develop a comprehensive knowledge of Tools and Techniques used in Management of wireless Networks
- 10) Develop ability to carry out research in area of security in wireless Networks

COURSE CONTENT

Unit I : Foundation

Review of wireless communication Technologies : Cellular Networks, Wireless LAN, Personal Area Networks, Adhoc and Sensor Networks, Challenges in Adhoc and Sensor networks: Constrained Resources, Security, Mobility

Unit II :

Adaptability in Mobile computing, Mobility Management: Location Management Principles and Techniques, Data Dissemination and Management.

Unit III :

Mobile and Wireless Security Issues, Approaches to security, Security in Wireless Personal Area Networks: Bluetooth Security Modes, Bluetooth Security Mechanisms, Authentication and Encryption in Bluetooth networks.

Unit IV :

Security in Wireless Local Area Networks: WEP, WPA, IEEE802.11i, Security in Metropolitan Area Networks: IEEE 802.16 and Security.

Unit V :

Security in Wide Area Networks: GSM Security, Four Generations of Wireless: 1G-4G, limitations and Security. Security in Ad hoc and Sensor networks.

Learning Outcomes: Students will :

- Learn about mobility management and data dissemination techniques in wireless networks
- Be familiar with various security issues specific to wireless networks and mitigation techniques.

- Know the current research topics of wireless networks security.

Text and Reference books:

- [1] Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, S.K. Gupta, G. Richard
- [2] III, L. Schwiebert, Mc Graw Hill, Ed.2005.
- [3] Hacking Exposed : Mobile Secrets & Solutions, N.Bergman, M.Stanfield, J.Rose, J. Scambray.
- [4] Building Secure Wireless Networks with 802.11, Jahanzeb Khan and Anis Khwaja, Wiley 2003.
- [5] Ad Hoc Wireless Networks - Architectures and Protocols, C.Siva Ram Murthy and B.S.Manoj.,
Prentice Hall, 2004
- [6] Technical Papers.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Sp. Advance Cloud Computing) Semester - B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR2G1: Advance Cloud Computing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

To study the latest Computing Technologies of Computer Science.

COURSE CONTENT

Unit 1: Introduction to Cloud Computing and Virtualization:

Computing era , Cloud evolution, Principles of parallel and distributed computing. Cloud Computing introduction, Vision, Characteristics as per NIST, need of cloud computing.

Virtualization-Benefits of Virtualization, Challenges in virtualization, characteristics of virtualized environments, Taxonomy of virtualization technique, components of virtualization, resource virtualization. Principles of virtualization platforms. virtual Servers, virtual Network, VDI.

Unit 2: Cloud Computing Architecture:

Cloud Computing Reference Model, Cloud architecture, Service Models (XaaS), Cloud deployment models, Cloud Adaptaion policy, Data centre Architecture with reference model.

Scalability and fault tolerance- Cloud migration, cloud migrating strategies, Risk Associated during cloud Migrating.

Unit 3: Security and legal issues in Cloud Computing:

Security issues in Cloud storage- Data in Rest, Data in Motion, Data in flight, Identity and access management, Authentication services in cloud. Data Sanitization In Cloud (Antiforensics)

Cloud threats- Threat actors in cloud, Current Threats in cloud, Mitigation techniques for Cloud threats, Cloud Contracting models, Methods for Data loss prevention.

Legal and Compliance Issues- Service level Agreement management. Cross Boarder Data Storage issue, Cloud Governace model, Business Continuity, Diasater recovery as a service model (**DRaaS**). Data retention and Backup policies.

Unit 4: Inter Cloud Computing/Federated Environment:

Federated Cloud- Characteristics, Cloud Federation Stack, Motivation for Cloud Interoperability, Cloud Interoperability Scenario, Challenges, Intercloud enabling techniques, Inter-Cloud Standards, Inter-Cloud Project examples.

Role of standards- HIPAA, SOX, PCIDSS, CloudSecurity Alliance, Ownership of data.

Unit 5: Cloud Platforms:

Case studies on Cloud Platforms - Amazon web services, Google App Engines, Microsoft Azure, Salesforce Cloud.

Business Cloud – Busines model in cloud Applications, Capex and Opex in computing, Business and Consumer applications. Energy efficiency in clouds.

Cloud Deployment- Setting up a small cloud , Cloud application development, Fog Computing, Big Data application on cloud, Cloud mining, Tool practice : Cloud-Sim.

Text and Reference books:

- 1) *Rajkumar Buyya; Cloud Computing Principles and Paradigms; John Wiley & Sons 2011.*
- 2) *Rajkumar Buyya; Mastering Cloud Computing; Elsevier Inc 2013.*
- 3) *Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010*
- 4) *Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach" McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.*
- 5) *Dimitris N. Chorafas, "Cloud Computing Strategies" CRC Press; 1 edition [ISBN: 1439834539], 2010.*

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR2G2: Applied Cryptography	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective:

To impart the knowledge of encryption and decryption techniques and their applications in managing the security of data.

COURSE CONTENT

Unit I : Modular Arithmetic and Multiplicative Group

Modular Arithmetic for advanced cryptography, Multiplicative group of integers \mathbb{Z}_n , order of an element in \mathbb{Z}_n , generator of \mathbb{Z}_n , extended Euclidean algorithm, Pohlig-Hellman and Pollard-Rho algorithm for computing DLP, Integer factorization problems, Pollard-Rho factoring algorithm.

Unit II : Tools for Symmetric key & Public key Cryptography

Shannon ciphers and perfect security, computational ciphers and semantic security, efficient adversaries and attack games, trapdoor function schemes, trapdoor function pair schemes, ElGamal cryptographic system, ElGamal digital signatures, fun applications.

Unit III : Block Ciphers and Their Attacks

Polynomial arithmetic, finite field $GF(2^n)$, constructing block cipher in practice, sophisticated attacks on block ciphers, case study block cipher AES: AES structure, AES transformation functions, AES key expansions, AES Implementation, fun applications.

Unit IV : Cryptanalysis, IDS and Attacks

Intrusion detection system (IDS), cross site scripting attacks, SQL injection attacks, fault injection attacks, side channel attacks, algorithmic attacks.

Unit V : Asymmetric Key Cryptosystems

MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.

Text and Reference books:

- [1] Douglas R. Stinson; "Cryptography Theory and Practice"; Chapman & Hall/CRC
- [2] Williams Stallings; "Cryptography & Network Security"; Pearson Education.
- [3] Mathew Bishop; Introduction to computer Security; Addison-Wisley
- [4] Atul Kahate; "Cryptography and Network Security"; Tata McGraw-Hill.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) II Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
5IT456/5IT486 Biometrics & Human Interface	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	50	25	-	-	75

Objective:

To study the concepts of various biological based information security systems.

Pre-requisite: NIL

COURSE CONTENTS

UNIT-I

Overview of Biometrics: Definitions, biometric modalities, course outline, Basic applications: access control, e-commerce, forensics.

UNIT-II

Design of a Biometric System: Building blocks, Modes of operation, Fingerprint verification: Minutiae Based Fingerprint Matching, Non-minutiae Based Representations, Fingerprint Enhancement, and Fingerprint Classification.

Face Recognition:- Introduction, Authentication vs. Identification, Challenges in Face recognition, Algorithms for face recognitions.

UNIT-III

Iris Recognition: Introduction, devices for capturing Iris, Iris representation schemes, Iris recognition algorithms. Biometrics based on hand geometry, signature, ear, palm, voice and DNA.

UNIT-IV

Multimodal Biometrics: Limitations of unimodal systems, multibiometric scenarios, levels of fusion, system design, score fusion techniques, score normalization, user-specific parameters, and soft biometrics.

UNIT-V

Case Study Presentations: Biometrics in Banking Industry, Biometrics in Computerized, Patient Records, Biometrics in Credit Cards, Biometrics in Mass Disaster Victim, Identification Forensic Odontology

Books Recommended:

- 6) D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar; “*Handbook of Fingerprint Recognition*”; Springer Verlag, 2003.
- 7) A.K. Jain, R. Bolle, S. Pankanti (Eds.); “*BIOMETRICS: Personal Identification in Networked Society*”, Kluwer Academic Publishers, 1999.
- 8) J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.); Biometric Systems: Technology, “*Design and Performance Evaluation*”; Springer, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Information Technology (Sp. Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ISR2E1: Biometric Systems & Security	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective:

To study the concepts of various biological based information security systems.

COURSE CONTENT

Unit I : Overview of Biometrics

Definitions, biometric modalities, course outline, Basic applications: access control, e-commerce, forensics.

Unit II : Design of a Biometric System

Building blocks, Modes of operation, Fingerprint verification: Minutiae Based Fingerprint Matching, Non-minutiae Based Representations, Fingerprint Enhancement, and Fingerprint Classification. Face Recognition:- Introduction, Authentication vs. Identification, Challenges in Face recognition, Algorithms for face recognitions.

Unit III : Iris Recognition

Introduction, devices for capturing Iris, Iris representation schemes, Iris recognition algorithms. Biometrics based on hand geometry, signature, ear, palm, voice and DNA.

Unit IV : Multimodal Biometrics

Limitations of unimodal systems, multibiometric scenarios, levels of fusion, system design, score fusion techniques, score normalization, user-specific parameters, and soft biometrics.

Unit V : Case Study Presentations

Biometrics in Banking Industry, Biometrics in Computerized, Patient Records, Biometrics in Credit Cards, Biometrics in Mass Disaster Victim, Identification Forensic Odontology

Text and Reference books:

- [1] D. Maltoni, D. Maio, A. K. Jain, and S. Prabhakar; "Handbook of Fingerprint Recognition"; Springer Verlag, 2003.
- [2] A.K. Jain, R. Bolle, S. Pankanti (Eds.); "BIOMETRICS: Personal Identification in Networked Society", Kluwer Academic Publishers, 1999.
- [3] J. Wayman, A.K. Jain, D. Maltoni, and D. Maio (Eds.); Biometric Systems: Technology, "Design and Performance Evaluation"; Springer, 2004.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Information Technology (Spl Information Security) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASR2S1: Soft Skills-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

[1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.

[2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007

[3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.

[4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) SEMESTER I						
Subject Code & Name		Instructions Hours per Week			Marks					
5IT401/5IT431 Advance Computer System		L	T	P		TH	CW	SW	PR	Total
		3	1	-	Max	100	50	-	-	150
Duration of paper: 3 hrs					Min	50	25	-	-	75

Objective:

To strengthen the knowledge of computer architecture based on the recent developments and to appreciate internal working of modern computer systems.

Prerequisites:

Basic knowledge of computer organization, data structures and programming.

COURSE CONTENTS

UNIT-I

~~Traditional Development from Von Neumann Model to Parallel Model; Computer Design Principles.~~

UNIT-II

~~Instruction Set Principles and Examples; Instruction Level Parallelism: Concepts; Techniques and Software Approaches.~~

UNIT-III

~~Memory Hierarchy Design; Multiprocessors and Threaded Architectures; Storage Systems.~~

UNIT-IV

~~Interconnection Networks and Clusters.~~

UNIT-V

~~Cases of Microprocessors; Micro controllers and Embedded Architectures.~~

Books Recommended:

- 1) J. L. Hennessy and D. A. Patterson, Computer Architecture: A Quantitative Approach, 3/e, Morgan Koffman Press, 2002.
- 2) K. Hwang and Briggs, Computer Architecture and Parallel Processing, McGrawHill, 1986.
- 3) Latest white paper from the relevant websites.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security)					
Subject Code & Name	Instructions Hours per Week			Marks					
5IT402/5IT432 Object Oriented Analysis and Modeling	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Objective: To be able to analyze the system/ application to be developed; and to be ready to design and implement the software systems from industry perspective.

Prerequisites: Preliminary Object Oriented Concepts.

COURSE CONTENTS

UNIT I

Software Engineering Best practices; Unified Process: Workflow and Lifecycle; Modeling

UNIT II

Object Orientation and Mechanisms; Requirements Management; Creating Artifacts; SRS, Use Case Models, Supplementary Specifications

UNIT III

Use Case Analysis, Responsibilities, Attributes and Associations

UNIT IV

Analysis and Design Overview; Architectural Analysis

UNIT V

Unified Modeling Language, Structural, Behavioral, Architectural Modeling, UML Diagram and Tools

Books Recommended:

- 1) P.Kruchten, The Rational Unified Process: An Introduction, Pearson Education Asia, 2000.
- 2) G. Booch, I. Jacobson, J. Rumbaugh, The Unified Modeling Language- User's Guide, Addison Wesley, 1999.
- 3) W. Boggs and M. Boggs, Mastering UML with Rational Rose, BPB Publication, 1999.
- 4) G.Booch, Object-oriented Analysis and Design with Applications, Addison Wesley, 1994.
- 5) M.Blaha, J.Rambaugh, Object-Oriented Modeling and Design with UML, Pearson Education 2nd edition, 2007.
- 6) www.sdmagazine.com, www.rational.com

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Information Technology) (Sp. Information Security) II Semester					
Subject Code & Name	Instructions Hours per Week			Marks					
5IT452/5IT482 Security in e-Commerce Applications	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Objective:

To boost security issues involve in e-Commerce applications.

Pre-requisite: NIL

COURSE CONTENTS

UNIT-I

Introduction to internet business: Defining E business, E business categories.
 Preparing the online business: Designing, Developing, and Deploying the System.
 Selecting the technology: IT infrastructure, choosing the right enterprise applications.

UNIT-II

Legal Issues: Global contracts, Web site domain name battle, National encryption laws, Digital signatures, Digital complaint services, IT act 2000.

UNIT-III

E business Applications: Searching the internet, Portal sites, the new all in one mega web sites, shopping solutions, Auctions and trading mechanisms, safe exchange, payment mechanisms, Chat solutions.

UNIT-IV

Security on the internet: Creating a security strategy, Applications of cryptography, privacy, fighting virus and hoax virus warnings, conflict in the information age, Client based security, Server based security.

UNIT-V

Paying via internet: Payment business, minimizing the risk, Internet payment models, fraud detection, post payment systems, credit card solutions, internet cheques, debit cards, online experience, electronic cash, smart cards. Biometrics.

Books Recommended:

- 1) Daniel Amor ; “The E-business Evolution” ; Pearson Education Asia 2nd edition

Academic Year: July-2015 to June-2016
 Programme: M.E. I (PT) Branch : Electronics and Telecommunication (with specialization in Digital Communication)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	SET534	Advance Digital Communication	DCPIC1	Modern Communication System	60%
2	SET532	Embedded Microcontroller	DCPIC2	Embedded System using ARM Microcontroller	100%
3			DCPIG1	Advance System Design	100%
4	SET531	Advance Computer Networking	DCP2C3	Advance Computer Networking	15%
5	SET536	Satellite Communication	DCP2E1	Satellite Communication	10%
6			DCP2W1	Seminar/ Workshop/Research Tool	100%
7			ASP2S1	Soft Skills - I	100%
8	SET533	Mobile Communication			
Average % change in ME program = Total average / 3 =					69%
Average % change in ME program = Total average / 3 =					13.00%

S.V. Zaveri
 5.12.18

Shiraj P

~~Shiraj P~~

Amal B

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B. Srinivas

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 Pranshu

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 Amal

Academic Year: July-2016 to June-2017
 Programme: M.E. II (PT) Branch : Electronics and Telecommunication (with specialization in Digital Communication)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	SET581	Modeling, Simulation and Evaluation Techniques	DCP3C1	Modelling and Simulation	5%
2			DCP3C2	Mobile Communication Networks	100%
3			DCP3G1	Broadband Access Technology	100%
4			DCP4C3	System Design Using Verilog	100%
5	SET589	VLSI Technology	DCP4E1	Analog and Digital CMOS Circuit Design	20%
6			DCP4W2	Seminar/ Res. Tool/Research Tool	100%
7			ASP4S2	Soft Skills -2	100%
8	SET582	Advance Digital Signal Processing			
9	SET584	Programming Language for Communication systems			
Average % change in ME program = Total average / 3 =					75%
Average % change in ME program = Total average / 3 =					25.00%

S.V. Zaverkar
 5.12.18

Hiwari

Prasad

5/12
 Review

Sharma

Pradip

Prasad

5/12

Sharma

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) Part Time I - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET534 Advanced Digital Communication	L	T	P		TH	CW	SW	PR	Total
Duration of paper: 3 hrs	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Course Objectives:

To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems like in Mobile communication, Wireless Local area Networks.

To develop skills to analyze these processes using basic Fourier techniques.

To evaluate performance of a digital communication system using the Matlab function.

To develop an orientation towards research in telecommunication engineering.

Prerequisite(s):

Basic knowledge of digital communication.

COURSE OF CONTENTS

UNIT -I

~~Review of Fourier Techniques and its application for Linear System analysis, Fourier Transform Properties, Classification of Signals, Spectral Density, Autocorrelation, Random Signals (random Variables, Random Processes, Stationarity, Time Averaging and Ergodicity), Noise in Communication Systems, Bandwidth of Digital Data.~~

UNIT -II

~~Formatting and baseband Modulation and Demodulation - Sampling & quantization, Non-uniform Quantization, Digital Encoding Techniques, PCM, DPCM, ADPCM, DM, ADM, Line Coding NRZ, RZ, Bi-phase, Duo-binary etc., their comparison and Spectrum associated with their waveforms, Detection of Binary Signals in Gaussian Noise, Maximum Likelihood Receiver Structure, Matched filter, Correlator, Error Probability Performance of Binary signaling, M-ary Pulse Modulation, Pulse Shaping, Duo-binary Signaling, Eye Patterns.~~

UNIT -III

~~Band Pass Modulation and Demodulation- Digital Band pass Modulation Techniques binary PSK, DPSK, QPSK, M-ary PSK, QAM, M-ary FSK, MSK, GMSK their Generation, Signal Space representation, Band-width requirements, Detection (Coherent, Non-coherent), Performance analysis and Comparison in presence of noise.~~

UNIT -IV

~~Selected topics in Digital Communication- Digital transmission in Fading Multipath Channels, Types of Fading, Mitigating the Effects of Fading, Spread Spectrum Communication Systems, Generation of PN Sequences, Direct Sequence Spread Spectrum, Frequency Hopped Spread Spectrum, Its applications to communication systems, Multi Carrier Modulation and OFDM, An OFDM system Implemented via FFT Algorithms, Application of OFDM.~~

UNIT -V

~~An Introduction to Information Theory, The Source Coding Theorem, Huffman and Lempel-Ziv Source Coding Algorithms, Modeling of Communication Channels, Channel Capacity, Bounds on Communication, Types of Error Control, Linear Block Codes, Generator Matrix, Parity Check Matrix, Error Correction and Syndrome Testing, Minimum Distance of a Linear Code, Cyclic Codes, Hamming Codes, BCH Codes, Convolutional Encoding, State,~~

Tree, Trellis Diagram, Maximum Likelihood Decoding, Hard and Soft decisions, Properties of Convolutional Codes, Finite Fields, R-S Coding and Decoding, Introduction to Interleaving and Concatenated Codes.

BOOKS RECOMMENDED

- [1] Bernard Sklar, "*Digital Communication*", Pearson Education, 2nd Edition, 2004.
- [2] J.G.Proakis & M.Salehi, "*Fundamentals of Communication Systems*", Pearson Education, 2006.
- [3] J.G.Proakis, *Digital Communication*, McGraw Hill, 4th Edition, 2001.
- [4] Taub & Schilling, *Principles of Communication System*, 2nd Edition, TMH
- [5] Lathi B. P., *Modern Analog and Digital Communication Systems*, 3rd Edition, Oxford Univ. Press,.
- [6] Haykins Simon, *Digital Communication*, 3rd Edition, Wiley Publication.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- A				
Subject Code & Name		Instructions Hours per Week		Credits				
DCP1C1 Modern Communication System		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	2	3	1	1	5

Course Objectives: To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems. To analyze and evaluate performance of a digital communication system.

Prerequisite(s): Basic knowledge of digital communication

COURSE CONTENTS

UNIT -I

Review of basic concepts of communication systems, Source encoding, Speech encoding techniques (Source encoders, SBC, LPC, Hybrid coders), their applications, Base-band modulation techniques their comparison and spectrum associated with their waveforms.

UNIT -II

Channel coding-Linear Block Codes, Convolution Codes, Turbo Codes their encoding and decoding, introduction to high level channel codes, interleaving and concatenated codes.

Digital modulation and demodulation - PSK, DPSK, QPSK, M-aryPSK, QAM, MSK and GMSK their generation, detection & performance analysis and comparison in presence of noise.

UNIT –III

Multi-carrier modulation and OFDM, Orthogonality, Block diagram of OFDM, Applications of OFDM, **Issues in OFDM** systems. Spread spectrum systems: Types, PN sequences, Characteristics of PN sequences, generation and detection of DSSS and FHSS, Spreading gain, Applications to communication systems, **Multi-user detection**.

UNIT –IV

Wireless channels and propagation path loss models – ISI, Types of fading, models for multi-path reception, propagation models for wireless networks, Fading mitigation techniques, **Equalization principle and types (LTE, ZFE, MMSE and DFE)**.

UNIT –V

Diversity techniques (frequency, time, and space), Multi-antenna systems, Smart antennas, Beamforming and MIMO system, spatial multiplexing, Tradeoffs among Diversity, Beam-forming gain & spatial multiplexing, Introduction to Cognitive Radio and Cooperative communication.

BOOKS RECOMMENDED

- [1]. Bernard Sklar, “*Digital Communication*”, Pearson Education, 2nd Edition, 2004.
- [2]. J.G.Proakis, *Digital Communication*, McGraw Hill, 4th Edition, 2001.
- [3]. Lathi B. P., *Modern Analog and Digital Communication Systems*, 3rd Edition, Oxford Univ. Press, 2010.
- [4]. Haykins Simon, *Digital Communication*, 3rd Edition, Wiley Publication, 2005.
- [5]. I.S. Misra, *Wireless Communications and Networks*, 2nd Edition, TMH, 2009.
- [6]. A. F. Molisch, *Wireless Communications*, 2nd Edition, Willey, 2014.
- [7]. T. S. Rappaport, *Wireless Communications Principles & Practice*, 2nd Edition, PHI, 2005.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) Part Time I SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET532 Embedded Microcontroller	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

Designing microcontroller hardware, understanding use of timers and interrupts in different applications ability to serially transmit-receive the data at standard baud rate with an interface, using microcontroller in industrial applications, embedded software architecture

Prerequisite(s):

Knowledge of microprocessor, peripherals, interfaces and assembly language programming

COURSE OF CONTENTS

UNIT -I

Microprocessor and microcontroller comparison, microcontroller survey, 8051 architecture General purpose registers, special function registers, input/output ports and circuits, internal memory connecting external memory, and I/O interface 8255 ,data transfer, arithmetic, logical, branch instructions, bit related instructions , assembly language programming

UNIT -II

Interrupts ,timer flag interrupt , serial port interrupt ,external interrupt ,interrupt control, interrupt priority interrupt destination , software generated interrupts , counter and timers , timer modes of operation ,timing subroutines pure software time delay, software polled timer, pure hardware delay, look up tables

UNIT -III

Serial data communication, different modes , serial data transmission reception using time delay , by polling , interrupt driven , microcontroller applications as interfacing with keyboard and display devices A/D and D/A converters , waveform generation , frequency and pulse width measurement, stepper motor control etc.

UNIT -IV

8051 family members as 8052 with capture timer, A/D and D/A equipped family members, watch dog timer, pulse width modulation, analog comparators, PIC 16C6X/7X,16 F8XX microcontroller and architecture , industrial applications of microcontroller

UNIT -V

Software architectures Round robin, Round robin with interrupts, function queue scheduling, Real time operating system architecture task states, scheduler, reentrancy, shared data problem, interrupt latency RTOS semaphores and problems , inter task communication with message queues, mailboxes and pipes, Basic design using real time operating system

BOOKS RECOMMENDED

- [1] Mohamed. Ali Mazidi, Janice Ali Mazidi, Rolin D. McKinley, “The 8051 microcontroller & Embedded System, 2nd Edition Pearson Education, 2006
- [2] Kenneth J.Ayala, 8051 microcontrolle r, Architecture, Programming & Applications, Penram international publishing (India) Pvt Ltd, 1996
- [3] David E. Simon, An Embedded software Primer, 1st Pearson education, 1999

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP1C2 Embedded System using ARM Microcontroller	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Objectives: The objective of this course is to teach students design and interfacing of ARM microcontroller-based embedded systems. High-level languages are used to interface the ARM microcontrollers to various applications. There are extensive hands-on labs/projects.

Prerequisite: Knowledge of Microprocessor and C++ Programming.

COURSE CONTENTS

UNIT-I

Introduction: Definition of Embedded System, Embedded Systems Vs General Computing Systems, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Core of the Embedded System: General Purpose and Domain Specific Processors, Embedded system architecture: RISC and CISC, RISC: Introduction of ARM Processors, Evolution of ARM, ARM design philosophy, ARM Processor fundamentals: Data flow model, Registers, Program Status Register, Pipeline, Interrupts and Vector Table, ARM Processor Families and Nomenclature.

UNIT -II

ARM Basic Instruction Set: Introduction to 32 bit programming, Instruction Set Architecture of ARM, Addressing modes, Data Processing Instructions, Branch Instructions, Load and Store Instructions, Conditional Instructions, PSR Instructions, Stack Instructions.

UNIT -III

ARM Thumb Instruction Set: Overview, Branch instructions, Data processing instructions, Status register access instructions, Single register load and store instructions, Multiple register load and store instructions, Semaphore instructions, Coprocessor instructions, Stack Instructions, Interrupt Instructions.

UNIT -IV

ARM Programming- Assembly Language Programming: Directives-AREA, ENTRY, END etc., Assembly code using instruction scheduling, Register Allocation, Conditional Execution and Loops. C programming for ARM: Simple C program using function, pointers, structures, etc, Exception Handling, Interrupts, Interrupt Handling Schemes

UNIT -V

Interfacing and applications programs for LCD display, PWM ,ADC, DAC application, measurement and control of physical parameter as temperature , stepper motor control, DC motor control etc.

Books Recommended:

- [1]. “ARM System Developer’s Guide Designing and Optimizing System Software” by Andrew N. Sloss, Elsevier publication, 2004.
- [2]. Arm System-On-Chip Architecture, 2/E , by Par Furber, Pearson Education Limited, 2000.
- [3]. “EMBEDDED SYSTEM DESIGN”, By Par Santanu Chattopadhyay, PHI Learning Private Ltd., 2013.
- [4]. “Embedded Microcomputer Systems, Real Time Interfacing, by Jonathan W. Valvano –Brookes /Cole, 1999, Thomas Learning.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics (Sp. Digital Communication) Part Time I – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET535 (Elective) Advanced Logic Design	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
	Duration of paper: 3 hrs			Min	50	25	-	-	75

Course Objective:

To provide an in-depth knowledge regarding designing of advance digital circuits. To emphasize on FSM based sequential circuit design and analysis of designed circuits for timing and performance.

Prerequisite:

Knowledge of basic digital electronics and state diagrams.

COURSE OF CONTENTS

Unit-I

Background for Digital Design

~~Logic Function Representation and Minimization, K Map Minimization, EV K Map Minimization, Function Minimization by Using K map XOR Patterns and Reed-Muller Transformation~~

Unit-II

Combinational Logic Design

~~No arithmetic Combinational Logic Devices Multiplexers, Decoders, Encoders, De Multiplexers, Code Converters, Magnitude Converters, Parity Generators and Error Checking Systems, Combinational Shifters, Steering logic and Tri-state gate application.~~

~~Arithmetic Devices Binary adders and subtractors, Carry Look ahead Adder, Multiple number addition and Carry save adder, Multipliers, Parallel Dividers, Dedicated ALU design featuring RC and CLA Capability, Mux approach to ALU Design, Dual Rail system and ALU with completion signals.~~

~~Propagation Delay and Timing Defects in Combinational Logic.~~

Unit-III

Introduction to Synchronous State Machine Design and Analysis

~~Models for Sequential Machines, Basic Memory Cell, Flip flop, Flip Flop Conversions, Asynchronous Preset and Clear overrides, Latches and Flip flop Timing Problems, Design of Synchronous state machine, Detection and elimination of output race glitches, static hazard in output logic, Clock Skew, Switch debouncing circuit, ASM chart and state tables.~~

~~Module and Bit Slice Devices Registers, Synchronous binary counters, Shift register counters, Asynchronous counters.~~

Unit-IV

Asynchronous State Machine Design and Analysis

~~Features of Asynchronous FSM, Lumped path delay models, Excitation table for LPD model, State diagram, state table and excitation table for Asynchronous FSM, Basic cell design using LPD model, Design of RET Flip flops, Detection and elimination of timing defects, single transition time machines, Hazard-free design, One Hot Design for asynchronous FSM.~~

Unit-V

Advance Sequential Designs

~~Externally Asynchronous/ Internally Clocked systems and Applications, Asynchronous Programmable Sequencers, One-hot Programmable asynchronous sequencers, Pulse mode approach to asynchronous FSM Design.~~

Books Recommended:

- [1] Richard.F.Tinder, "*Engineering Digital design*", 2nd Edition, 2000, Academic Press.
- [2] William I. Fletcher, " *An Engineering Approach to Digital Design* ", Prentice Hall of India, 1996.
- [3] James E. Palmer, David E. Perlman, " *Introduction to Digital Systems* ", Tata McGraw Hill, 1996.
- [4] N.N. Biswas, " *Logic Design Theory* ", Prentice Hall of India, 1993.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication)Part Time Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCPIG1 Advance System Design	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	0	3	1	0	4

Course Objective: To provide an in-depth knowledge regarding designing of advance digital system. To emphasize on system design for timing and performance trade off.

Prerequisite: Knowledge of basic digital electronics, state diagrams and graph theory.

COURSE CONTENTS

Unit 1:

Introduction to digital IC design – full Custom and semicustom design flow and comparison ,
Combinational Logic Design, Synchronous State Machine Design and Analysis, Asynchronous State Machine Design and Analysis, Synthesis and Optimization of Digital Circuit (AREA, POWER AND DELAY). LOW and High Level Synthesis process, optimization of hardware. combinational logic synthesis – Technology independent and technology dependent optimization –Logic synthesis

Unit 2:

High level synthesis- Scheduling and allocation-ASAP and ALAP scheduling-Register allocation-Functional unit allocation-Interconnect path allocation-Hardware description languages-synthesis-register transfer design-Event driven simulation. Low power issues in high level synthesis and logic synthesis.

Unit 3:

Resource Sharing and Binding, Sharing and Binding for Resource-Dominated Circuits, Resource Sharing in Non-Hierarchical Sequencing Graphs, Resource Sharing in Hierarchical Sequencing Graphs, Register Sharing, Multi-Port Memory Binding, Bus Sharing and Binding, Sharing and Binding for General Circuits, Unconstrained Minimum-Area Binding.

Unit 4:

Subsystem design principles-pipelining-Data paths in processor architecture – Standard cell design considerations of adder and multiplier- Timing -Slack delay model – Effect of skew and jitter on timing, Sources of skew and jitter- Clocking disciplines -Wire model- Technology scaling effect on interconnect and -Noise in interconnects.

Unit 5:

FPGAs Introduction to FPGA, FPGA Programming technologies, Static SRAM, Anti Fuse, EPROM, EEPROM, Xilinx FPGA (XC2000, XC3000, XC4000 and XC5000), Logic block Architecture. Field Programmable Logic Sequencer, application of FPLS Devices. Programmable Array Logic Series 20, Combinational PAL Devices, Sequential PAL Devices, Arithmetic PAL Devices.

BOOKS RECOMMENDED:

- [1]. John M Yarbrough, “Digital Logic Applications and Design”, Thomson learning
- [2]. Synthesis and optimization of Digital Circuits , Giovanni De Micheli , Tata McGraw Hill Edition
- [3]. Jan M Rabaey, Digital Integrated Circuits - A Design Perspective, Prentice Hall, Second Edition, 2005.
- [4]. Naveed A. Sherwani, Algorithms for VLSI Physical Design Automation, Springer, Third edition, 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) I-SEMESTER (Part Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5ET531 Advance Computer Networking	3	-	-	Max	100	50	-	-	150
Duration of paper: 3 hrs				Min	50	25	-	-	75

Course Objectives:

Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.

Prerequisite(s):

Fundamentals of computer networking, concepts of programming and operating systems.

COURSE OF CONTENTS

UNIT -I

Introduction and overview of OSI reference module, TCP/IP reference model, and ~~physical layer its functions~~, data link layer, MAC sub layer, their functions, overview of data link layer and Mac sub layer protocols (stop & wait, sliding window, aloha, CSMA, CSMA/CD, CSMA/CA).

UNIT -II

~~Network layer Design Issues, Routing Algorithms Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Broadcast Routing, Multicast Routing, and Routing in Ad Hoc Networks. Congestion Control Algorithms, General Principals , Prevention Policies, Congestion Control in, Virtual Circuit Subnets, Datagram Subnets, Load shedding, Jitter Control.~~

UNIT -III

~~Quality of Services, Requirements, Techniques for Achieving Q OS, Internetworking, Tunneling, and Internet work Routing, Network Layer in the Internet, IP Protocol, IP Addresses, OSPF, BGP, Internet Multicasting, Mobile IP- IPV6.~~

UNIT -IV

~~Transport Service, Services Provided to Upper Layers. Transport Primitives, Berkeley Sockets, Elements of Transport Protocols, Addressing, Introduction to UDP, Introduction to TCP, TCP Service Model, TCP Protocol, TCP Segment Header. Performance Problems in Computer Networks, Network Performance Measurements. System Design for Better Performance.~~

UNIT -V

Various Application Layer Protocols DNS, SMTP, IMAP, WWW, Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, Symmetric and Asymmetric Key Algorithms, DES, RSA, Digital Signature.

BOOKS RECOMMENDED

- [1] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
- [2] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- [3] W. Stalling, "Data & Computer Communication", 8th Edition Pearson Education, 2006.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP2C3 Advance Computer Networking	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: Appreciate working network layer protocols, selection of appropriate routing algorithm, understanding of QOS parameters, understanding of transport and application layer protocols, use of cryptography in computer networking.

Prerequisite(s): Fundamentals of computer networking, concepts of programming and operating systems.

COURSE CONTENTS

UNIT-1

Network Models, OSI Model, TCP/IP Protocol Suite, Addressing, Data Rate Limits, Performance Parameters, Transmission Media, Switching, Data Link Layer, Error Detection and Correction techniques.

UNIT-2

Data Link Control- LLC, HDLC , Multiple Access, Random Access, Wired LANS- Standard Ethernet, Fast Ethernet , Gigabit Ethernet , Wireless LANS, Bluetooth, Connecting Devices.

UNIT-3

Network Layer- Logical Addressing, IPV4 Addresses, IPV6 Addresses, Transition From IPV4 to IPV6, Address Mapping, ARP protocol, ICMP, Unicast Routing Protocols, Multicast Routing Protocols, Routing in Autonomous System

UNIT-4

Transport Layer- Process-To-Process Delivery, User Datagram Protocol (UDP), TCP, SCTP, Congestion Control, Quality of Service, Techniques to Improve QoS

UNIT-5

Application Layer- Domain Name System, Electronic Mail, File Transfer Protocol, HTTP, WWW, Remote Login (TELNET, SSH), Simple Network Management Protocol (SNMP), Internet Security- Network Layer Security, Transport Layer Security and Application Layer Security, Firewalls

BOOKS RECOMMENDED

- [1] B. Forouzan, "TCP/IP Protocol Suite", McGraw Hill, 3/e, 2006
- [2] Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP Vol. II design, Implementation of Intranets.", PHI, 3rd Edition 2000
- [3] A. S. Tanenbaum, "Computer Networks", 4th Edition Pearson Education, 2003.
- [4] W. Stalling, "Network Security and Cryptography", 4th Edition Pearson Education, 2006.
- [5] B. Forouzan, "Data Communication and Networking" 4th Ed Tata McGraw Hills

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year DC Electronics(Sp. Digital Communication) II-SEMESTER (Part Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET536 Satellite Communication (Elective)	L	T	P		TH	CW	SW	PR	Total
	3	-	-	Max	100	50	-	-	150
Duration of Theory Paper: 3 Hours				Min	50	25	-	-	75

Course Objectives:

This course consists of three parts. The first part addresses the satellite systems covering the topics of orbits and constellations, satellite space segment, and propagation and satellite links. The second part reviews satellite communications techniques including modulation, coding, multiple access and on-board processing. The third part presents various satellite communications systems and applications with emphasis on recent development in LEO satellite systems for personal communications.

Prerequisite(s):

Radio Propagation, Electromagnetic Theory, Antenna and Wave Propagation.

COURSE OF CONTENTS

Unit-I

Introduction: Satellite system architecture, ~~factors influenced the system~~, Satellite orbits, Classification of Orbits, Orbital Perturbations, ~~Orbital Maneuvers, Satellite Constellations.~~

Unit-II

Radio Link: The basic RF link, Link Equation, Link Performance, Satellite links: Up link Equation and Down link equation, Overall system Performance.

Unit-III

Modulation, Coding and Multiple Access: ~~Source Signals- Voice, Data and Video, Analog transmission system, Digital transmission system and TV transmission system, Coded orthogonal frequency division multiplexing (COFDM) modulation system.~~

Unit-IV

Multiple Access: Basic multiple access resources, Multiple access format, FDMA, Preassigned and Demand assigned FDMA, TDMA system, TDMA frame structure, TDMA terminal equipment, Satellite switch TDMA, CDMA, Spread spectrum technique, Direct and Frequency Hopping CDMA.

Unit-V

Commercial issue and Applications: ~~Transponders~~, Satellite navigation system, Direct Television Broadcast system, VSAT system, GPS system.

BOOKS RECOMMENDED:

- [1] M. Richharia, "Mobile Satellite Communications", 2nd Edition, Pearson Education Asia, 2004
- [2] T. Pratt, C. Bostian and J. Allnutt, "Satellite Communications" John Wiley and Sons, 2003.
- [3] W. Pritchard, H. Suyderhoud and R. Nelson, "Satellite Communication System Engineering", 2nd Edition, Pearson Education Asia, 2005
- [4] D. Roddy, "Satellite Communication", 3rd Edition, McGraw-Hill, March 2001.
- [5] Bruce R. Elbert, "Introduction to Satellite Communication", 2nd Edition, Artech House, Inc, 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			ME – I Year (Spl Digital Communication) Semester- A				
Subject Code & Name	Instructions Hours per Week			Credits			
DCP2E1 Satellite Communication	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 6 Hours/week							

Course Objectives: The course provides fundamentals, link design, overview of practical consideration and applications of satellite communication.

Prerequisite(s): Fundamentals of communication systems.

COURSE CONTENTS

Unit I

SATELLITE ORBITS: Kepler's Laws, orbital mechanics and parameters, – Look Angle Determination, orbital perturbations-longitudinal and inclination changes, geo stationary and non-geo-stationary orbits, Orbital Effects in Communications system performance- Doppler shift, range variations, solar eclipse, sun transit outage, Launching Procedures - launch vehicles.

Unit II

SATELLITE SUB-SYSTEMS AND LINK DESIGN: Satellite sub systems, Attitude and Orbit control system, Telemetry, Tracking and command. Communication sub-systems- Description of the communication system and various types of transponders, satellite antennas.

Satellite link design-Basic transmission theory, system noise temperature and G/T ratio, design of downlinks, satellite system using small earth stations, uplink design, system design examples, Ku band uplink and downlink design and rain effects on Ku band.

Unit III

MODULATION AND MULTIPLEXING TECHNIQUES FOR SATELLITE LINKS: Frequency modulation, Analog FM transmission by satellite, digital transmission, digital modulation and demodulation digital transmission of analog signals, time division multiplexing- TDM terminology, TDM systems and channel synchronization in TDM.

Unit IV

MULTIPLE ACCESS TECHNIQUES USED IN SATELLITE COMMUNICATION: FDMA-intermodulation, calculation of C/N with intermodulation, TDMA-Bits, symbol and channels, frame structure, TDMA in a fixed station network- synchronization and transmitter power in TDMA networks, CDMA, spread spectrum transmission and reception, CDMA in a fixed earth station and LEO satellite network.

Unit V

SATELLITE APPLICATIONS: VSAT Systems-overview, network architecture, access control protocols, modulation and multiple access selection, VSAT earth station and calculation of link margin, Low earth orbit and Non Geo –stationary satellite systems-Orbit consideration, coverage and frequency consideration, delay and throughput considerations, system considerations, DBS system, Satellite navigation and the Global Positioning System .

BOOKS RECOMMENDED:

[1]. T. Pratt, C. Bostain, J. Allnutt, 'Satellite Communications', Second Edition, John Wiley &

- Sons, 2003.
- [2]. M.Richharia, 'Satellite Communication Systems-Design Principles", Macmillan 2003
 - [3]. Bruce R. Elbert, 'The Satellite Communication Applications' Hand Book, Artech HouseBoston London, 1997.
 - [4]. Tri T. Ha, 'Digital Satellite Communication', II edition, 1990.
 - [5]. Emanuel Fthenakis, 'Manual of Satellite Communications', McGraw Hill Book Co.,1984.
 - [6]. Brian Ackroyd, 'World Satellite Communication and earth station Design', BSP professional Books, 1990.
 - [7]. G..B.Bleazard, 'Introducing Satellite communications NCC Publication, 1985.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP2S1: Soft Skill-1	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Prerequisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self-Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [3] Kumar Mahi. Stress Coping Skills Ebook, Health & Medicine, Technology, 2009.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) II-SEMESTER (Part Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
SET533 Mobile Communication	L	T	P		TH	CW	SW	PR	Total
	3	-	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	125

Course Objectives:

To provide the knowledge of different generation mobile communication system, cellular concept, and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite(s):

It is expected to know the following concepts: Electromagnetic spectrum, analog and techniques, Shannon Fano & Huffman coding, Channel coding theorem, Codes.

COURSE CONTENTS

~~UNIT-I~~

~~Introduction to wireless communication system. Conventional mobile system, Concept of cellular mobile system, Frequency Management Channel assignment, Co-channel interference reduction, Handoff strategies and considerations, Cell capacity, Cell splitting, Sectorization of cells, Micro cell zone concept. Trunking and grade of service.~~

~~UNIT-II~~

~~Duplexing techniques, Comparison of FDMA and TDMA mobile systems, Principles of CDMA mobile system, Packet radio protocols. mobile radio propagation: Large scale path loss, Free space propagation model. Three basic propagation mechanisms: Reflection, Diffraction, Scattering. Practical Link Budget design using path loss models, Outdoor propagation models. Small scale fading and multipath.~~

~~UNIT-III~~

~~Modulation Techniques for mobile radio, Equalization Techniques Diversity Techniques. RAKE Receiver, Channel coding, Speech coding technique.~~

~~UNIT-IV~~

~~Wireless system and standards: GSM system and architecture CDMA network (IS-95) : Architecture, Forward link, Reverse link, IEEE 802.11 standard, IEEE 802.16 Standard, WCDMA, CDMA 2000. DECT standard, Architecture and protocols. Up gradation for GSM: HSCD, GPRS, EDGE.~~

~~UNIT-V~~

~~Mobile Network layer, Mobile transport layer, WAP, air interface, system development, mobile management, radio resource management, EIRP management, radio frequency monitoring, Quality of service, Mobile satellite system.~~

BOOKS RECOMMENDED

- [1] TS Rappaport "Wireless Communication", Pearson Education
- [2] Jacohen Schilling "Mobile Communication", Pearson Education

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) Part Time II - SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET581 Modeling Simulation and Evaluation Techniques	L	T	P		TH	CW	SW	PR	Total
	3	1	-	Max	100	50	-	-	150
	Duration of paper: 3 hrs			Min	50	25	-	-	75

Course Objectives:

- To give exposure of stochastic processes and to show their importance in engineering education and research
- To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results.
- To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes
- To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s):

Fundamental knowledge of Probability Theory.

COURSE OF CONTENTS

UNIT –I

Introduction to Probability Theory - Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables - Definition, Discrete and Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Distributions for Discrete and Continuous Random Variables, Geometric Distribution, Poisson Distribution, Uniform Distribution, Exponential Distribution, Normal Distribution, Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable, ~~Moment Generating Function.~~

UNIT –III

Markov Chains- Classification of Stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, ~~and Chapman Kolmogorov Equation,~~ Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes and Queuing Theory-Introduction to Continues Time Markov Chains, Birth and Death Processes, The Transition Probability Function, Limiting Probabilities, Non Birth Death Processes, Exponential Distribution & Poisson Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and ~~M/G/1~~ Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation.

BOOKS RECOMMENDED

- [1] K.S.Trivedi, "*Probability and Statistics with Reliability, Queuing and Computer Science Applications*", 2nd Edition, A Wiley-Interscience Publication.
- [2] Averill M. Law, W. David Kelton, "*Simulation Modeling and Analysis*", 3rd Edition, Tata McGraw-Hill Publication.
- [3] S.M. Ross, "*Introduction to Probability Models*, 9th Edition, Elsevier Publication", 2007.
- [4] A Papoulis, S.V Pillai, "*Probability Random Variables and Stochastic Processes*", 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India				ME – I Year (Spl Digital Communication) Part			
Institute of Engineering & Technology				Time Semester- B			
Subject Code & Name		Instructions Hours per Week		Credits			
DCP3C1		L	T	P	L	T	P
Modeling and Simulation		3	1	2	3	1	1
Duration of Theory Paper:							
3 Hours							Total
							5

Course Objectives: To give exposure of stochastic processes and to show their importance in engineering education and research To develop skills to identify a process, its inputs and outputs. Then to develop a model and quantify the results. To give an hands on experience in MATLAB to be used as a simulation tool for the stochastic processes To develop an orientation towards research in electronics and computer engineering.

Prerequisite(s): Fundamental knowledge of Probability Theory.

COURSE CONTENTS

UNIT –I

Introduction to Probability Theory -Relative Frequency and Classical Definitions, Sample Space and Events, Conditional Probabilities, Independent Events, Bayes Formula, Bernoulli Trials.

UNIT –II

Random Variables- Definition, Discrete Random Variables, Probability mass Function , Distribution Functions: Bernouli pmf, Bionomial pmf, Geometric pmf, Poisson pmf, Continuous Random Variables, Cumulative Distribution Function(CDF), Probability Density Function (PDF), Exponential Distribution, Reliability and failure rate, Normal Distribution, Uniform Distribution. Mean, Variance and Moments of Random Variables, Function of a Random Variable and it's Expectation, Jointly Distributed Random Variable.

UNIT –III

Markov Chains- Classification of stochastic process, Introduction to Markov chains, Classification of States, Transition Probabilities, Limiting State Probabilities, Higher Transition Probabilities, Concept of Transient States and Absorption Probabilities, Solution of Problems Based on Markov Chains.

UNIT –IV

Markov Processes -Introduction to Continues Time Markov Chains, Birth nd Death Processes, The Transition Probability Function, Limiting Probabilities, Exponential Distribution & Poison Process. Solution of Problems Based on Continuous Time Markov Chains, Introduction to Queuing Theory and M/M/1 Queuing Systems.

UNIT –V

Simulation- Simulation of Queues, Statistical Inference and Few Examples on Simulation Estimation of Mean and Variance, Confidence Interval, Regression and Correlation analysis

BOOKS RECOMMENDED

- [1]. S.M. Ross, “Introduction to Probability Models, 9th Edition, Elsevier Publication”, 2007.

- [2]. K.S.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2nd Edition , A Wiley-Interscience Publication.
- [3]. Averill M. Law,W. David Kelton, "Simulation Modeling and Analysis", 3rd Edition, Tata McGraw-Hill Publication.
- [4]. A Papoulis, S.VPillai, "Probability Random Variables and Stochastic Processes", 4th Edition, TMH Publication, 2002.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- B				
Subject Code & Name		Instructions Hours per Week		Credits				
DCP3C2 Mobile Communication Networks		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: To provide the knowledge of cellular concept, types of wireless networks, different generations mobile communication systems,, and the aspects of mobile radio environment which is very different than conventional communication system.

Prerequisite(s): Knowledge of digital communication, OSI Model and internet protocol.

COURSE CONTENTS

Unit 1

Evolution of Modern Mobile Wireless Communication Systems: Different types of Wireless Communication, Classification of Wireless Networks: Wireless Local Area Networks, Personal Area Networks, Fixed Wireless Access, Ad-hoc and Sensor Networks, Satellite Cellular Communication, First Generation, Second Generation, Third Generation wireless Networks, All-IP Networks, Requirements for services, Technical Challenges of Wireless Communications.

Unit 2

Cellular Systems Design Fundamentals: Multiple access Techniques, Cellular Structure, Cell Cluster, Frequency Reuse, Co-channel and Adjacent channel Interference, Enhancement of system Capacity, Channel Assignment, Cellular Communication principles, Mobility Management, Radio Resource Management, 1G AMPS system.

Unit3

2G and 2.5 G Systems: GSM system architecture, Air interface, Logical and Physical Channels, Voice encoding, channel encoding, Cryptography, Frequency hopping, Equalization in GSM, Connection establishment and Handover, Protocols and Signaling, Services and Billing.
GPRS system architecture, Signaling, Roaming, Interfaces and Related Protocols, IP internetworking Model, GPRS applications.

Unit 4

3G Systems: WCDMA/UMTS: System Overview, Air Interfaces, Physical and Logical Channels, Speech coding, Multiplexing, Channel Encoding, Spreading, Modulation, Power control, Connection Establishment, Handover.
3GPP LTE: System Overview, Physical Layer, Logical and Physical Channels, Physical Laye Procedures.

Unit 5

IP for Mobile Networks :Overview of IP, IP Routing protocols, Basic Mobile IP, IP for GPRS and UMTS, Integration of different Technologies, Mobility management in Wireless Networks, All IP Networks, Key technologies for 4G.

BOOKS RECOMMENDED:

- [1]. A. F. Molisch, "Wireless Communications", Second Edition, Wiley Publications, 2014.
- [2]. I. S. Misra, "Wireless Communications & Networks", Second Edition, MGH, 2013.
- [3]. J. Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- B				
Subject Code & Name		Instructions Hours per Week		Credits				
DCP3G1 Broadband Access Networks		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	0	3	1	0	4

Course Objectives: To provide a detailed structure and working of different networks used for accessing broadband signals.

Prerequisite(s): knowledge of analog and digital communication and basic.s of computer networks

COURSE CONTENTS

Unit 1

Introduction: Broadband access, Its definition, coverage and economic impact, Legacy broadband technologies, Fixed wireline broadband technologies (Digital subscriber line, Cable modem, Broadband over power line), Fixed wireless broadband technologies (MMDS, Free space optics , Satellite) Mobile wireless broadband technologies (GPRS, EDGE, UMTS).

Unit2

WLAN:Types, System architecture, Protocol Architecture, Medium access control CSMA/CA, Comparison of IEEE variants of WLAN (IEEE 802.11 – 802.11 ac), Frame formats, Modulation and coding, High Throughput WLANs., Wi-Fi based Wireless Mesh Networks.

Unit 3

WiMax: System Overview, Fixed Wi-Max, Mobile Wi-max, Physical Layer Overview (Modulation and coding, Physical and logical channels, Multiple antenna Techniques, Link Control), MAC Layer, Multihop relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks.

Unit 4

Optical Networking: Introduction and challenges- Advantages of optical network, WDM optical networks, WDM network evolution, WDM network construction, broadcast and select optical WDM network, wavelength routed optical WDM network, Challenges of optical WDMnetwork.**Optical Access Network** Introduction to access network, PON, EPON , GPON and WDMEPON: overview, principal of operation, architecture, standards; dynamic Bandwidth allocation and Quality of Service.

Unit 5

Optical switching & FiWi access networks Optical packet switching basics, slotted and unslotted networks, header and packet format, contention resolution in OPS networks, self routing, examples on OPS node architecture, optical burst switching, signaling and routing protocols for OBS networks, contention resolution in OBS networks, Radio over Fiber, Radio and Fiber, Integration of EPON and WiMax, Hybrid Wireless-Optical Broadband Access Network / Fiber wireless (FiWi) access networks.

BOOKS RECOMMENDED:

- [1]. Optical Network Series: Biswanath Mukherjee, Springer, 2006.
- [2]. Optical Networks: R.Ramaswami and K.Sivarajan, Morgan Kaufmann Publishers, 2nd ed., 2002.
- [3]. A. F. Molisch, "Wireless Communications", Second Edition, Wiley Publications, 2014.
- [4]. Schiller, "Wireless Communications", Second Edition, Pearson Education, 2008.
- [5]. 3. Optical Switching Networks: Mayer & Martin, Cambridge University Press, 2008.
- [6]. Broadband Access Networks -Technologies and Deployments, Editors: Shami, Abdallah, Maier, Martin, Assi, Chadi (Eds.) , Springer, 2009.
- [7]. FiWi Access Networks, [Martin Maier](#), [NavidGhazisaidi](#), Cambridge University Press,2011.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Part Time Semester- B				
Subject Code & Name		Instructions Hours per Week			Credits			
DCP4C3 System Design Using Verilog		L	T	P	L	T	P	Total
		3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours								

Course Objectives: To enable the students to translate a functional system description into appropriate digital blocks coded in Verilog .Perform synthesis, place, and route of a digital design into a target FPGA

Prerequisite(s): Digital Design, Microprocessor architecture, C++ language.

COURSE CONTENTS

UNIT –I

Overview of Digital Design with Verilog HDL -Evolution of CAD, emergence of HDLs, typical HDL-based design flow, why Verilog HDL?, trends in HDLs.

Hierarchical Modeling Concepts -Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

Basic Concepts -Lexical conventions, data types, system tasks, compiler directives.

UNIT -II

Modules and Ports-Module definition, port declaration, connecting ports, hierarchical name referencing.

Gate-Level Modeling -Modeling using basic Verilog gate primitives, description of andlor and buflnot type gates, rise, fall and turn-off delays, min, max, and typical delays.

Dataflow Modeling -Continuous assignments, delay specification, expressions, operators,operands, operator types.

UNIT -III

Behavioral Modeling -Structured procedures, initial and always, blocking'and nonblocking statements, delay control, event control, conditional statements, multiway branching, loops, sequential and parallel blocks.

Tasks and Functions -Differences between tasks and functions, declaration, invocation.

Useful Modeling Techniques -Procedural continuous assignments, overriding parameters, conditional compilation and execution, useful system tasks.

UNIT -IV

Timing and Delays -Distributed, lumped and pin-to-pin delays, specify blocks, parallel and full connection, timing checks, delay back-annotation.

Switch-Level Modeling- MOS and CMOS switches, bidirectional switches, modeling of power and ground, resistive switches, delay specification on switches.

UNIT -V

Logic Synthesis with Verilog HDL-Introduction to logic synthesis, impact of logic synthesis, Verilog HDL constructs and operators for logic synthesis, synthesis design flow, verification of synthesized circuits, modeling tips, design partitioning.

BOOKS RECOMMENDED

- [1] Samir Palnitkar , “*Verilog HDL-A guige to Digital Design and Synthesis* “ 2nd Edition, Pearson , 2006.
- [2] J. Bhaskar, “*A Verilog HDL Primer*”, B.S Publications,
- [3] Douglas J. Smith, “*Hdl Chip Design : A Practical Guide for Designing, Synthesizing & Simulating ASICs & FPGAs Using VHDL or Verilog*”.Doone Pubns ,1998.
- [4] Blaine Readler , “*Verilog by Example: A Concise Introduction for FPGA Design*”, Full Arc Press, 2011

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME I Year Electronics(Sp. Digital Communication) Part Time II – SEMESTER					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5ET589 (Elective) VLSI Technology	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75
Duration of paper: 3 hrs									

Course Objectives:

This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology

Prerequisite(s):

Knowledge of semiconductor devices is required.

COURSE OF CONTENTS

UNIT -I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT -II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ration, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT -III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT -IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

UNIT -V

Layout: Stick diagram rules for nMOS and CMOS technology, lambda based and micron based design rules. Layout design for CMOS inverter Circuit, circuit Extraction from Layout. Limitations of CMOS in NANO scale circuit design.

BOOKS RECOMMENDED

- [1] Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
- [2] R. Jacob Baker, Harry W. Li and David E. Boyce, *CMOS Circuit design, layout and Simulation*, Series Edition, PHI, IEEE press,
- [3] Yuan Taur and Tak H. Ning, *Fundamentals of Modern VLSI Devices*, Special Edition, Cambridge university press,1998
- [4] Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*,2nd Edition, PHI,.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP4E1 Analog and Digital VLSI Circuit Design	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: This course presents the fundamental of CMOS VLSI design with different VLSI design methodologies and combinational, sequential and semiconductor memory circuit design. It also covers the limitations of CMOS in NANO technology with introduction to the NANO Technology.

Prerequisite(s): Knowledge of semiconductor devices is required.

COURSE CONTENTS

UNIT -I

Introduction: VLSI design flow, VLSI design style, Fabrication process Flow: basic Steps, the CMOS n-well Process. Metal oxide semiconductor (MOS) structure, Types of MOSFET: Enhancement and Depletion. Structure and operation of MOS transistor. MOSFET process simulation.

UNIT -II

MOS transistor: threshold voltage of MOSFET, controlling of threshold voltage, MOSFET current – Voltage Characteristics. Transconductance, Drain conduction. Aspect ratio, process parameters, second order effects, MOS small signal and Large signal model, MOS capacitances.

UNIT -III

CMOS Inverter: Analysis of different types of inverter circuit, CMOS inverter, transfer characteristic, calculation of propagation delay, rise time, fall time, noise margin and power dissipation for CMOS Inverter. Effect of threshold voltage and supply voltage on Delay and power dissipation.

UNIT -IV

CMOS circuit Design: CMOS logic, pseudo NMOS logic, pass transistor logic, Transmission Gate logic and Dynamic logic circuit design. Designing of Combinational logic circuit, sequential logic circuit design and semiconductor memory circuit.

Unit –V

CMOS Analog Circuit Design: Large signal models, small signal models, current sources, single stage amplifiers, differential amplifiers, operational amplifiers, frequency response, frequency response of amplifiers, frequency response of operational amplifiers, stability and frequency compensation, frequency compensation

BOOKS RECOMMENDED

- [1]. Sung-mo Kang and Yusuf Leblebici, *CMOS Digital Integrated Circuit analysis and Design*, 3rd Edition, Tata McGraw-Hill.
- [2]. [Neil H.E. Weste and Kamran Esharhian, *Principal of CMOS VLSI design*, 2nd Edition, PHI, (anded), AW/Pearson, 2001.
- [3]. CMOS mixed-signal circuit design by R. Jacob Baker Wiley India, IEEE press, reprint 2008.
- [4]. Design of analog CMOS integrated circuits by Behad Razavi McGraw-Hill, 2003.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP4S2: Soft Skill-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede’s Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics Groups – Definition & Meaning, Stages & Process of Group Formation, types, **Work Group Behavior –** structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining Team:

Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics Power & Politics:

Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
- [3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ramneek Kapoor, Managerial Skills, Pathmaker Bangalore, Nakoda Publishers & Printers, 1st Ed.
- [6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Electronics(Sp. Digital Communication) III-SEMESTER (Part Time)						
Subject Code & Name		Instructions Hours per Week			Marks					
5ET582 Advance Digital Signal Processing	Duration of paper: 3 hrs	L	T	P		TH	CW	SW	PR	Total
		3	-	2	Max	100	50	50	50	250
					Min	35	25	25	25	110

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s):

A basic course in Digital signal processing.

COURSE OF CONTENTS

UNIT -I Signals and Signal Processing: Characterization and Classification of signals; Sampling and Quantization; Typical signal Processing Operations; Examples Typical Signals and Systems; Typical Signal Processing applications; Why Digital Signal Processing; Building blocks of a Digital signal processor; Discrete Time Fourier Transform, Z – transform and properties.

UNIT -II

Discrete Fourier Transform: Introduction; Computation of DFT and IDFT; Periodic and symmetry properties of DFT; DTFT v/s DFT; Circular shift and Circular convolution Linear convolution using DFT; Block convolution, Overlap – add method and Overlap – save method.

UNIT -III

Fast Fourier Transform: Radix Two DIT and DIF FFT algorithm; Butterfly computation; Bit reversed mapping; In place computation; Composite – N algorithm; Prime factor algorithm.

UNIT -IV

Digital Filter Structures: Block Diagram Representation; Signal Flow Graph Representation; Equivalent structures; Basic FIR Digital Filter structures; Basic IIR filter structures; state space structure; All Pass Filter; Tunable IIR Digital filters; Cascaded lattice realization of IIR and FIR Filters; Parallel all Pass Realization of IIR Transfer Function; Computational Complexity of Digital Filter structures; Tellegen theorem and its applications. (Transposition theorem and Network sensitivity formula.)

UNIT -V

Digital Filter Design: Brief Review of Analog Filter Design; Impulse Invariance method of IIR filter design; bilinear Transform Method of IIR Filter Design; Design of Digital IIR notch Filters; Low Pass IIR digital filter design based on Truncated Fourier Series; FIR Filter Design Based on Frequency Sampling Approach; computer aided design of digital filters. Introduction to speech and language processing.

BOOKS RECOMMENDED

- [1] Sanjit K. Mitra; *Digital Signal Processing A Computer- Based Approach*; 9th Edition, Tata McGraw Hill .
- [2] V.K.Khanna; *Digital Signal Processing; Telecommunications and Multimedia Technology* Wheeler Publishing 1999.
- [3] Richard G. Lyons *Understanding Digital Signal Processing*; .; First Indian Reprint ,Addison Wesley Longman Inc 1999.
- [4] B. Somanathan Nair “*Digital Signal Processing, Theory, analysis and Digital filter design*”; PHI New Delhi India 2005.
- [5] A. V. Oppenheim and R. W. Schaffer “*Digital Signal Processing*”

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
DCP1G3 Advance Digital Signal Processing	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Objective: To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s): A basic course in Digital signal processing.

COURSE CONTENTS

Unit 1

Overview of DSP, FIR filters, IIR filters, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, Linear prediction & optimum linear filters stationary random process, forward- backward filters linear prediction, solution of normal equation.

Unit2

Multi rate DSP, Sampling rate conversion, poly phase filters, multistage decimator & interpolator, QMF, digital filter banks, DFT in spectral estimation., Adaptive filters & spectral estimation.

Unit 3

Minimum mean square criterion, , LMS algorithm, Recursive least square algorithm, Application of DSP & Multi rate DSP Application to Radar, introduction to wavelets, application to image processing, design of phase shifters, DSP in speech processing & other applications

Unit 4

Image representation : Gray scale and color images , image sampling and quantization. Image enhancement: Filter in spatial and frequency domains , histogram based processing and homomorphic filtering. Edge Detection edge linking, boundary descriptors. Image Segmentation : Thresholding, region based segmentation Image Compression: lossy and lossless compression techniques.

Unit 5

Entropy coding, lossy and lossless predictive coding, uniform and non uniform quantizers, transform based compression, JPEG, Image reconstruction from projections: Principles, mathematical basis of tomography. Projections, The Fourier Slice Theorem, Reconstruction Algorithms for Parallel Projections, Three dimensional projections. Computer visualization of 3D data : Rendering techniques: Surface based and volume based techniques. Direct Volume rendering: Ray casting, opacity function. Maximum Intensity Projection

BOOKS RECOMMENDED:

- [1]. Gonzalez and Woods : Digital Image Processing, Pearson Education 3rd Edition
- [2]. A.K.Jain : Fundamentals of Digital image processing , PHI
- [3]. J.G. Proakis and D.G .Manolakis Digital signal processing: Principles, algorithm and applications, Macmillan publishing
- [4]. Ifeachor E.C., Jervis B.W. Digital signal processing, a Practical approach, 2nd ed. Pearson edu. 2003.
- [5]. Salivahanan, Vallavaraj & Gnanpriya Digital signal processing:: Tata Mcgraw Hill
- [6]. References:
- [7]. S.W.Smith Digital signal processing: A practical guide for engineers and scientists, Elsevier
- [8]. S.K.Mitra , Digital signal processing:: Tata Mcgraw Hill

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Electronics(Sp. Digital Communication) III-SEMESTER (Part Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
5ET582 Advance Digital Signal Processing	L	T	P		TH	CW	SW	PR	Total
	3	-	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	35	25	25	25	110

Course Objective:

To provide clear conceptual knowledge of different DSP algorithms and to introduce speech, multimedia and other signal processing applications.

Prerequisite(s):

A basic course in Digital signal processing.

COURSE OF CONTENTS

~~**UNIT – I Signals and Signal Processing:** Characterization and Classification of signals; Sampling and Quantization; Typical signal Processing Operations; Examples Typical Signals and Systems; Typical Signal Processing applications; Why Digital Signal Processing; Building blocks of a Digital signal processor; Discrete Time Fourier Transform, Z—transform and properties.~~

~~UNIT – II~~

~~**Discrete Fourier Transform:** Introduction; Computation of DFT and IDFT; Periodic and symmetry properties of DFT; DTFT v/s DFT; Circular shift and Circular convolution Linear convolution using DFT; Block convolution, Overlap—add method and Overlap—save method.~~

~~UNIT – III~~

~~**Fast Fourier Transform:** Radix Two DIT and DIF FFT algorithm; Butterfly computation; Bit reversed mapping; In place computation; Composite—N algorithm; Prime factor algorithm.~~

~~UNIT – IV~~

~~**Digital Filter Structures:** Block Diagram Representation; Signal Flow Graph Representation; Equivalent structures; Basic FIR Digital Filter structures; Basic IIR filter structures; state space structure; All Pass Filter; Tunable HR Digital filters; Cascaded lattice realization of IIR and FIR Filters; Parallel all Pass Realization of IIR Transfer Function; Computational Complexity of Digital Filter structures; Tellegen theorem and its applications.(Transposition theorem and Network sensitivity formula.)~~

~~UNIT – V~~

~~**Digital Filter Design:** Brief Review of Analog Filter Design; Impulse Invariance method of IIR filter design; bilinear Transform Method of IIR Filter Design; Design of Digital HR notch Filters; Low Pass HR digital filter design based on Truncated Fourier Series; FIR Filter Design Based on Frequency Sampling Approach; computer aided design of digital filters. Introduction to speech and language processing.~~

BOOKS RECOMMENDED

- [6] Sanjit K. Mitra; *Digital Signal Processing A Computer- Based Approach*; 9th Edition, Tata McGraw Hill .
- [7] V.K.Khanna; *Digital Signal Processing; Telecommunications and Multimedia Technology* Wheeler Publishing 1999.
- [8] Richard G. Lyons *Understanding Digital Signal Processing*; .; First Indian Reprint ,Addison Wesley Longman Inc 1999.
- [9] B. Somanathan Nair “*Digital Signal Processing, Theory, analysis and Digital filter design*”; PHI New Delhi India 2005.

[10] A. V. Oppenheim and R. W. Schafer “Digital Signal Processing”

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME II Year Electronics(Sp. Digital Communication) III-SEMESTER (Part Time)					
Subject Code & Name	Instructions Hours per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
SET584 -Programming Language for Communication Systems	3	-	2	Max	100	50	50	50	250
Duration of paper: 3 hrs				Min	50	25	25	25	110

Course Objectives:

To understand and learn a programming language that expressly designed for use in the distributed environment of the technology along with an object-oriented programming model.

Prerequisite(s):

Knowledge Object Oriented Programming concept using object oriented languages such as C++, Objective C, Smalltalk, Eiffel, Common LISP Object System (CLOS), Object Pascal, and ADA 95 etc.

COURSE OF CONTENTS

UNIT – I Introduction to Object Oriented Programming and Java :

Object Oriented Concepts, Abstraction, Encapsulation, Information Hiding. Java features: Java syntax, data types, data type conversions, control statements, operators and their precedence. Introduction to Class: Instance members and member functions. Concept of object initialization, constructors, constructor overloading. Access modifiers: Class attributes and methods

UNIT – II

Inheritance and Polymorphism

Class relationships: Inheritance and its types, Merits and Demerits, Polymorphism: Dynamic method dispatch, Runtime polymorphism, Abstract classes, Interfaces and packages.

UNIT – III

Exception Handling, Multithreading and Introduction to Java APIs:

Exceptions: Need for exceptions, Checked Vs Unchecked exceptions, creating exceptions.
Multithreading: Introduction, Priorities and scheduling, Thread Synchronization and its life cycle. String Handling, Wrapper classes: Arrays and Vectors

UNIT – IV

Java I/O, Applets and Event Handling:

Basic concept of streams I/O stream & reader writer classes. File handling. Applet and its Life Cycle, Basic GUI elements, Event Delegation Model and event handling

UNIT – V

Introduction to elementary procedures, Real & Complex vector and Matrix & Determinants and operations like: Initialization, Duplication, Elimination, Interchanging, Rotation, Norms, Scaling, Multiplication & calculation of rank etc.

Evaluation of various polynomials like Chebyshev polynomial, Fourier polynomial etc.

Analysis of real matrix problems like: Overdetermined systems, underdetermined system, homogenous, pseudo inversion. Sparse Real matrices, Similarity Transformation, Eigen value problems.

Numerical differentiation, Differential equations,

Introduction to special functions like: Exponential, Gamma, Error, Infinite time series, Fast Fourier transforms etc

BOOKS RECOMMENDED

- [1] Hang T. Lau, *A Numerical Library in Java for Scientist & Engineers*, Library of Congress Cataloging-in-Publication Data by Chapman & Hall/ CRC Press Company.
- [2] Cay S. Horstmann, "*Core JAVA Vol-1*", Pearson Education.
- [3] Herbert Schildt, "*The complete Reference*", Tata McGraw Hill
- [4] Kathy Sierra, Bert Bates, *Head First Java*, 2nd Edition, O'Reilly

Academic Year: July-2015 to June-2016
 Programme: M.E (PT) I Branch :Computer Engineering (Software Engineering)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1			SEP1C1	Advanced Algorithms	100%
2	5CO232	Object Oriented Analysis & Modeling	SEP1C2	Object Oriented Analysis & Design	40%
3			SEP1G1	Soft Computing	100%
4			SEP1G2	Distributed Operating System	100%
5	5CO231	Advance Computer Systems	SEP1G3	Advance Computer Architecture	60%
6	5CO233	Software Construction	SEP2C3	Software Construction	20%
7	5CO283	Database Engineering	SEP2E1	Database Engineering	30%
8			SEP2E2	Big Data Analytics	100%
9			SEP2E3	Secure Software Engineering	100%
10			ASP2S1	Soft Skills -1	100%
11	5CO234	Object Oriented Design			
12	5CO235	Applied Digital Signal Processing			
13	5CO237	Optimization Algorithms			
14	5CO239	Embedded System Technology			
Average % change in ME program = Total average / 3 =					25%
Average % change =					75%

Sr. Lecturer 5.12.18. *(Signature)*
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Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1C1	L	T	P	L	T	P	Total
Advanced Algorithms	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Course Objectives: To introduce students a variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To familiarise the state of the art in some areas of algorithmic research, including open problems.

Prerequisites: Data Structures and Algorithms.

COURSE CONTENTS

UNIT - I

Review of basic concepts; Worst case and average case analysis, Asymptotic notation, Solving recurrence equations, Medians and order statistics, Advanced data structures: Binomial Heaps, Fibonacci Heaps, Data Structures for Disjoint Sets – Disjoint-set operations, Linked-list representation of disjoint sets, Disjoint-set forests, analysis of union by rank with path compression.

UNIT - II

Advanced Design and Analysis techniques: Greedy and Dynamic Programming strategies, Backtracking, Branch and Bound. Algorithms for Knapsack problems, Matrix-Chain Multiplication problem, Traveling Salesperson Problem (TSP), etc.
Amortized analysis: the aggregate method, the accounting method, the potential method, Dynamic tables.

UNIT - III

Graph algorithms: Breadth-first search, Depth-first search, Topological sorting, Minimum Spanning Trees, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flows: Augmenting Paths and Push-Relabel Methods, Minimum Cost Flows, Bipartite Matching.

UNIT - IV

Introduction to string matching problem, String matching algorithms: Naive algorithm, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore, etc. Applications in Bioinformatics.

Computational Geometry: Convex Hull. Line-segment Intersection. Sweep Lines. Voronoi Diagrams. Range Trees. Seidel's Low-dimensional LP Algorithm.

UNIT - V

Theory of NP-Hard and NP-Complete Problems: P, NP and NP-Complete complexity classes; A few NP-Completeness proofs; other complexity classes.

Dealing with intractability: Introduction, Combinatorial Optimization, approximation factor, PTAS, FPTAS, Approximation algorithms for vertex cover, set cover, TSP, knapsack, bin packing, subset-sum problem etc. Analysis of the expected time complexity of the algorithms.

Learning Outcomes:

Upon Completing the Course, Student will have:

1. Skills to analyze algorithms
2. Comparative judgments of different design techniques
3. Ability to solve real world problems
4. Idea about the hardness of some well-known problems including TSP, vertex cover, network flow and combinatorial optimization problems.
5. Familiarity with active research areas in connection with the study of algorithms.

BOOKS RECOMMENDED:

1. T. Cormen, C. Leiserson, R. Rivest, and C. Stein. **Introduction to Algorithms**. (3rd Ed). MIT Press, McGraw-Hill, 2010.
2. M.T. Goodrich, R. Tamassia, "Algorithm design – Foundations, Analysis, and Internet Examples", John Wiley, Second Edition.
3. V. V. Vazirani, **Approximation Algorithms**, Springer. 2001.
4. Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, **Network Flows: Theory, Algorithms, and Applications**,
5. E Horowitz, S Salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, University Press, 2007.
6. Aho, A V Hopcraft Ullman JD, "The Design and analysis of computer Algorithms", Pearson Education, 2007.

LIST OF PRACTICAL ASSIGNMENTS:

Practical assignments will be based on:

1. Performance analysis
2. Solving problems using design techniques discussed
3. Solution of network flow problems
4. Approximation algorithms
5. String matching algorithms
6. Combinatorial optimization problems
7. TSP problem
8. solving some real world problems using the skill gained in the course
9. study of NP-Complete, NP-Hard problems
10. Any other emerging/ active research problems in the area in consultation with the instructor.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1C2	L	T	P	L	T	P	Total
Object Oriented Analysis and Design	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course offers the opportunity to students to become skilled at the object oriented analysis and design. This is essential as it is the core of the software development process. This course shall help the student to comprehend the principles of object orientation and apply them as the solution for the real life problems in the form of object oriented design. At the end of the course the students shall be able to design a solution which works and solves software development problems.

Pre requisites:

1. Programming knowledge in any of the object oriented languages like C++, Java.
2. Familiarity and ease with data structures.

Unit I: Introduction to Modelling and UML 2.X

Importance of Modelling, Principles of Modelling, Object Oriented Modelling, Conceptual model of the UML, Architecture, Software Development Life Cycle

Unit 2: Basic and Advanced Structural Modelling

Basic Structural Modelling: Classes, Relationships, Common Mechanisms and Diagrams.

Advanced Structural Modelling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages

Unit 3: Class & Object Diagrams

Class & Object Diagrams: Terms, Concepts, Modelling Techniques for Class and Object Diagrams

Unit 4: Basic Behavioural Modelling

Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams, Events and Signals, State Machines, Processes and Threads, Time and Space Diagram, State Chart Diagrams

Unit 5: Architectural Modelling

Architectural Modelling: Component, Deployment, Component Diagrams and Deployment Diagrams, Case Study, Issues in OO Testing

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

REFERENCE BOOKS:

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modelling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.
3. Atul Kahate Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.

Learning Outcomes:

The aim of the course is to help the student be able to understand the real world problems. The student shall be able to solve the complexity of the problem and also depict the problem with the help of standard UML diagrams. In the process of software design the student shall be able to appreciate the application of diagrams, iterative approach which helps in improving the software quality.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO202/ 5CO232 OBJECT ORIENTED ANALYSIS AND MODELING**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO202/5CO232 Object Oriented Analysis and Modeling	L	T	P		TH	CW	SW	PR	Total
	3	1	2	Max	100	50	50	50	250
Duration of Paper: 3 Hrs.				Min	50	25	25	25	125

Objective:

To be able to analyze the system/ application to be developed; and to be ready to design and implement the software systems from industry perspective.

Prerequisites:

Preliminary Object Oriented Concepts.

CONTENTS

UNIT-I

Software Engineering Best practices; Unified Process: Workflow and Lifecycle; Modeling

UNIT-II

Object Orientation and Mechanisms; ~~Requirements Management; Creating Artifacts; SRS, Use Case Models, Supplementary Specifications~~

UNIT-III

~~Use-Case Analysis, Responsibilities, Attributes and Associations~~

UNIT-IV

Analysis and Design Overview; Architectural Analysis.

UNIT-V

Unified Modeling Language, Structural, Behavioral, Architectural Modeling, UML Diagram and Tools.

BOOKS RECOMMENDED

- [1] P.Kruchten, The Rational Unified Process: An Introduction, Pearson Education Asia, 2000.
- [2] G. Booch, I. Jacobson, J. Rumbaugh, The Unified Modeling Language- User's Guide, Addison Wesley, 1999.
- [3] W. Boggs and M. Boggs, Mastering UML with Rational Rose, BPB Publication, 1999.
- [4] G.Booch, Object-oriented Analysis and Design with Applications, Addison Wesley, 1994.
- [5] M.Blaha, J.Rambaugh, Object-Oriented Modeling and Design with UML, Pearson Education 2nd edition, 2007.
- [6] www.sdmagazine.com, www.rational.com

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SEP1G1	L	T	P	L	T	P	Total
Soft Computing	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

Learning Objectives:

1. To familiarize with neural networks and learning methods for neural networks.
2. To introduce basics of genetic algorithms and their applications in optimization and planning.
3. To introduce the ideas of fuzzy sets, fuzzy logic and fuzzy inference system.
4. To develop skills thorough understanding of the theoretical and practical aspects of Soft Computing.

Pre requisites: Analysis of Algorithm, Artificial Intelligence.

COURSE CONTENTS

UNIT-I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing ,Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing, Machine Learning Basics and Fundamentals of Neural Networks and Application.

UNIT-II

NEURAL NETWORKS

Backpropagation Networks, Architecture: perceptron model, single layer artificial neural network, multilayer perception model; backpropagation learning methods, effect of learning rule coefficient, backpropagation algorithm, factors affecting backpropagation training, Associative memory, Adaptive Resonance Theory.

UNIT-III

GENETIC ALGORITHMS

Genetic Algorithm(GA) Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, probability of crossover and probability of mutation, convergence. The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems. Simulated annealing

and stochastic models, Boltzmann Machine, Applications of Genetic Algorithm: genetic algorithms in search and optimization, GA based clustering Algorithm, Image processing and pattern Recognition.

UNIT-IV

FUZZY LOGIC

Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzyfication&Defuzzification, Fuzzy Controller, Industrial applications Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-V

NEURO, FUZZY MODELING

Adaptive Neuro, Fuzzy Inference Systems Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees Data Clustering Algorithms, Rulebase Structure, Identification , Neuro Fuzzy Control , Case studies.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply neural networks to pattern classification and regression problems
3. Recognize the feasibility of applying a soft computing methodology for a particular problem
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problems.

BOOKS RECOMMENDED:

[1] S. Rajasekaran and G.A.VijayalakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.

[2] Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.

[3] Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence - Bart Kosko, Prentice Hall, 1992.

[4] Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.

[5] David E. Goldberg, “Genetic Algorithms in search, Optimization & Machine Learning” , Addison-Wesley, 1997.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP2C3	L	T	P	L	T	P	Total
Software Construction	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To gain the knowledge for advance programming using JAVA

UNIT I

Object Oriented Concepts, Merits of Object Oriented Technology. Introduction to JAVA and its applications on the Internet. Constructors & constructor overloading, Access modifiers: Class attributes and methods. **Introduction to object model of software development.**

UNIT II

Introduction to Java classes and objects, Java features, data types data type conversions & control statements Operators and their precedence. Introduction to Class, Instance members and member functions.

UNIT III

String Handling, Wrapper classes Arrays and Vectors Inheritance and Polymorphism

Class relationships Inheritance and its types Merits and Demerits of Inheritance Introduction to Association, inheritance Polymorphism Dynamic method dispatch Runtime polymorphism Abstract classes, Interfaces packages

UNIT IV

Java I/O, Basic concept I/O stream reader-writer Exceptions: Need for exceptions Checked exceptions Unchecked exceptions Creating exceptions Multithreading Introduction, Priorities and scheduling of Threads Thread Synchronization and its life cycle Applet and its Life Cycle

UNIT V

Server side programming:- Java servlets, Java Server pages, Web application development using Java, **Database handling with Java.**

Text Books:

T1: Herbert Schildt, Java: The Complete Reference, 8th Edition

T2: Programming with java by e balagurusamy

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO203/ 5CO233 - SOFTWARE CONSTRUCTION**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO203/5CO233 SoftwareConstructio n	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Objective:

To enhance the programming and coding skills at a professional level and be able to develop the useful programs.

Prerequisites:

Basic knowledge of problem solving and programming fundamentals.

CONTENTS

UNIT I

Introduction:- Introduction to software construction and Java programming language. Importance of Java to the Internet, ~~Java buzzwords, overview of Java, data types, variables and arrays, operators and control statements, Data structures~~

UNIT II

Introducing classes and methods, overloading methods, argument passing, nested and Inner class, Inheritance, multilevel hierarchy, abstract classes, Packages and interfaces.

UNIT III

~~Exception handling, Multithreaded programming- Java thread model, Thread priorities, synchronization, interthread communication.~~

UNITIV

Input/Output, java I/O classes and interfaces, streams classes, Serialization, Networking, Java and Net, Applet basics and architecture, passing parameters to the applet, event handling.

UNIT V

Server side programming, Java servlets, servlet chaining, server side include, session tracking, JSP, scripting, Jar files and web application development, Connectivity and SQL, JDBC, ~~Java Beans, J2EE Overview- EJBs;~~

BOOKS RECOMMENDED

- [1] C.S.Horstmann and G. Cornell, Core Java-I: Fundamentals, Sun Microsystems Press, 1999 (Pearson Asia,2000).
- [2] C.S.Horstmann and G. Cornell, Core Java-II: Advanced, Sun Microsystems Press, 2000 (Pearson Asia,2000).
- [3] Ivor Horton, Beginning Java 2 JDK 1.3 Edition, WROX (Shroff Pub.)2000.
- [4] P. Naughton and H.Schildt, Java 2 Complete Reference, Tata McGrawHill,1999.
- [5] S. McConnell, Code Complete, Microsoft Press, 1993 (or latestavailable).
- [6] Latest white paper from the relevantwebsites.

Devi Ahilya University, Indore, India Institute of Engineering & Technology			I Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SEP2E1 DATABASE ENGINEERING	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- To understand how transactions are executed and concurrency mechanisms are used in practice.
- To understand how DBMS process queries and how it estimates the cost of query optimization.
- To understand how DBMS maintains data records and access paths.
- To understand the need and use of distributed database systems in practice.
- To familiarize with the emerging technologies of databases.

Prerequisites: Introductory knowledge of Database Systems.

COURSE CONTENTS

Unit-I

Transaction Processing & Concurrency Control: Introduction to Transaction Processing, Transaction Properties, Transaction recoverability and serializability, Transaction Support in SQL, Introduction to Concurrency Control, Two-phase locking, Timestamp ordering, Validation and other issues.

Unit-II

Query Processing & Optimization: Introduction, Translating SQL queries, Algorithms – External Sorting, Select, Join and Project operations, Aggregate and Outer Joins, Heuristics for Query optimization, Estimating cost in query optimization, Semantic optimization, Optimization used in practice.

Unit-III

Data Storage and Querying: File organization, Organization of records, Indexing and Hashing – Basic concepts, B+-tree index files, Static and dynamic hashing, comparison of indexing and hashing etc..

Unit-IV

Distributed Databases : Concepts, Techniques for Distributed database design – Data fragmentation, replication, and allocation techniques; Types of Distributed Systems, Query processing in Distributed Databases, Concurrency control & Recovery in Distributed Databases, Distributed Databases in MySQL.

Unit-V

Advance Topics: Information Retrieval and XML data, Spatial data management, NoSQL – Differences from Relational Databases, Theory, Key-Value Databases, Graph Databases etc.

Books Recommended:

1. Fundamentals of Database Systems, By R. Elmasri and S. Navathe, 6th Ed. Pearson Education, 2010.
2. Database Management Systems, R. Ramkrishnan and J. Gehrke, 3rd Edition, McGraw Hill Education, 2014.
3. Database System Concepts, By A. Silberschatz, H. Korth and S. Sudarshan, 6th Ed. McGraw Hill Education, 2013.
4. Database Systems, By T. Connolly and C. Begg, 4th Edition, Pearson Education, 2008.

List of Assignments:

During the learning of course, students need to do assignments:

1. Solving intermediate SQL queries involving join expressions, views and transaction support.
2. Using PL/SQL constructs involving procedures, triggers, recursive queries etc.
5. Assignment on Query processing and indexing.
4. Using concurrency and transactions
6. Distributed database support in MySQL or PostgreSQL.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO254/ 5CO283 – DATABASE ENGINEERING**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO254/5CO283 Database Engineering	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	2	Max	100	50	50	50	250
				Min	50	25	25	25	125

Section 1.01

Objective: This course will help the students to acquire the foundation of Database Management systems. It includes concepts relating to various advanced database models, and concepts like database mining and warehousing. This course also describes in major details about the foundation of relational database management systems. Thus, this is an advanced course, which will further develop the knowledge and skill acquired by the students at the basic level.

Prerequisites:

Preliminary Database Concepts.

CONTENTS

UNIT 1:

~~The Relational model, relations, relational operators, relational algebra and calculus, embedded SQL, storage structures in databases, advanced concepts of Entity relationship model.~~

UNIT 2:

~~Relational Database Design, Functional Dependency, Multi-valued dependency, Theory of Normalisation, Query Processing, Concurrency management, Recovery Management, Database Security management.~~

UNIT 3:

~~Advanced Data Models, Client-Server database model, Distributed database model, Database servers and Application servers, Object Oriented Data Model.~~

UNIT 4:

~~Knowledge Databases, Multimedia Databases, Geographical databases, webs database, Mobility and Personal Databases, Database as Backend to web Tools, ODBC, JDBC.~~

UNIT 5:

~~Data Warehousing: Concepts and Applications, Data Mining, Future trends etc. Architecture of advanced DBMS~~

BOOKS RECOMMENDED

1. Elmasria and Navathe, Fundamentals of Database Systems [4e], Pearson Education
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems [3e], McGraw-Hill
3. Korth, Silberchatz, Sudarshan, Database System Concepts, McGraw-Hill.
4. Peter Rob and Coronel, Database Systems, Design, Implementation and Management, Thomson Learning.
5. C.J.Date, Longman, Introduction To Database Systems, Pearson Education

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- A			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP2S1: Soft Skill-1	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Social Skills and Negotiation Skills

Life Skills: Generic, Problem Specific and Area Specific Skills, Self-Awareness : Definition, Types of Self- Self Concept, Body Image, Self Esteem Techniques used for Self Awareness: Johari Window, SWOT Analysis Empathy- Sympathy, Empathy & Altruism, Effective Communication - Definition, Functions, Models, Barriers.

Unit II

Thinking Skills

Thinking Nature, Elements of Thought, Types of Thinking, Concept Formation, Reasoning, Creative & Critical Thinking - Definition, Nature, Stages Problem Solving Definition, Steps in Problem Solving Factors Influencing Problem Solving Decision Making Definition, Process, Need, Consequences, Models of Decision Making Goal Setting.

Unit III

Coping Skills

Coping with Emotions - Definition, Characteristics, Types, Classification: Wheel Model, Two-Dimensional Approach, Coping Strategies Coping with Stress, Definition, Stressors, Sources of Stress, The General Adaptive Syndrome Model of Stress. Conflict Management- Sources, Impacts of Conflict and Conflict Resolution.

Unit IV

Personality

Defining Personality, Personality Determinants, Personality Development, Personality Change Various types of Personality. Motivation and its Process.

Unit V

Leadership

Definition of Leadership, Classification: Types of Leaders and Styles of Leadership, Characteristics and Functions of Leadership, Values and Ethics of Leadership.

Theories Of Leadership

Leader Member Exchange Theory, Contingency Theory, Path- Goal Leadership Theory Transformational Leadership Theory, Charismatic Theory.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] Debra McGregor, Developing Thinking; Developing Learning. A Guide to Thinking Skills in Education, Open University Press, McGraw Hill House, 2007.
- [3] Kumar Mahi. Stress Coping Skills Ebook, [Health & Medicine, Technology](#), 2009.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.
- [5] Ryan Carey, The Effective Altruism Handbook, Published in 2015 by the Centre For Effective Altruism Oxford, Oxfordshire United Kingdom.

[6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.

Academic Year: July-2016 to June-2017
 Programme: M.E (PT) II Branch : Computer Engineering (Software Engineering)

S.No	Old Scheme		New(CBCS) Scheme 2015		Percentage of Syllabus Change
	Course Code	Course Name	Course Code	Course Name	
1	5CO285	Project Management	SEP3C4	Software Project Planning and Management	80%
2	5CO281	Design Patterns	SEP3C5	Design Pattern	20%
3			SEP3G4	Data Mining & Warehousing	100%
4			SEP3G5	Cloud Computing	100%
5			SEP3G6	Simulation and Modelling	100%
6	5CO287	Software Testing & Quality Assurance	SEP4C6	Software Testing and Quality Assurance	5%
7	5CO206	Speech & Language Processing	SEP4E4	Speech And Language Processing	20%
8	5CO238	Machine Learning	SEP4E6	Machine Learning	40%
9			SEP4E5	Aspect Oriented Software Engineering	100%
10			ASP4S2	Soft Skills -2	100%
11	5CO282	Component Technology			
12	5CO284	Advance Computer Networks			
13	5CO286	Knowledge Management			
14	5CO288	Bioinformatics Computing			
15	5CO289	Web Application Development			
Average % change in ME program = Total average / 3 =					22.30%
Average % change =					67%

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Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SEP3C4	L	T	P	L	T	P	Total
Software Project Planning and Management	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

This course provides the knowledge for correct software development life cycle, create realistic project plans, and manage a software development team through each phase of the project.

The purpose of software project planning and management is to forecast many hazards and risks and problems as possible. The student shall be to plan, organize and control activities so that the project is completed as successfully as possible in spite of all the risks.

Pre-requisites:

A course on software engineering and practical experience of handling college projects.

COURSE CONTENTS

UNIT-I:

Introduction to Software Project Management

Project Definition, **Contract Management**, Activities Covered by Software Project Management, **Overview of Project Planning, Stepwise Project Planning**

UNIT-II:

Project Evaluation

Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation

UNIT-III:

Activity Planning

Objectives, Project Schedule, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass, Backward Pass, Activity Float, Shortening Project Duration, Activity on Arrow Networks, Risk Management, Nature of Risk, Types of Risk, Managing Risk, Hazard Identification, Hazard Analysis, Risk Planning and Control

UNIT-IV:

Monitoring and Control

Creating Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Managing Contracts, Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.

UNIT-V:

Managing People and Organizing Teams

Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation, The Oldman, Hackman Job Characteristics Model, Working In Groups, Becoming a Team, Decision Making, Leadership, Organizational Structures, Stress, Health and safety, case studies

Text Books:

1. Bob Hughes, Mikecoterrell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

REFERENCE Books

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, "Software Project Management", Pearson Education, 1999.
3. Jalote, "Software Project Management in Practice", Pearson Education, 2002.

Learning Outcomes:

The aim of the course is to help the student to be a responsible member of the software development team. The student after completion of the course shall be able to comprehend project problems and apply the knowledge on projects and software development. The student also shall be aware of the conditions and constraints such as resources, time, cost and quality.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO255/5CO285 PROJECT MANAGEMENT**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO255/5CO285 Project Management	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	MAX	100	50	-	-	150
				MIN	50	25			75

Objective: To develop a managerial skill for producing good quality software project and to provide a complete view of project development Life cycle.

CONTENTS

UNIT I

Projects and Products: Nature; Initiatives; Process; Product; Resources;

UNIT II

Project Lifecycle: Time & Cost Estimating; Design; ~~Planning Techniques; Risk Analysis;~~

UNIT III

Project Management Tools: Execution; Measurement; Reporting; Change and Configuration Management; Implementation issues & Integration Quality Management; **UNIT IV**

People Management: Task Allocation; Team Management; ~~Leadership; Multiple Project Coordination;~~

UNIT V

~~Development Management; Program Management; Project Documentation, Communication Issues~~

BOOKS RECOMMENDED

- [1] G. Mclod; Managing IT Projects; Couse Tech.; 1996.
- [2] F.P. Broks Jr. The Mythical Man – month; Addison Wesley; 1999.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP3C5 Design Pattern	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: To strengthen the knowledge of Object Oriented Design and Development by understanding various design patterns.

Pre requisites: Knowledge of object oriented system concepts, object oriented analysis and modeling and object oriented programming.

COURSE CONTENTS

UNIT-I

Introduction to Software Patterns, Overview of UML, Class Diagrams, Collaboration Diagrams, State chart Diagram, Deployment Diagram, Fundamental Design Patterns: Delegation, Interface, Abstract Super-class, Interface and Abstract class, Immutable, Marker Interface.

UNIT-II

Simple Factory pattern, Factory Method, Abstract Factory, Builder, Prototype, Singleton

UNIT-III

Adaptor, Bridge, Composite, Façade, Flyweight, Decorator, Proxy Pattern

UNIT-IV

Chain of Responsibility, Command, Interpreter, Mediator, Memento Pattern

UNIT-V

Observer, State, Strategy, Template Method, Visitor, Iterator Pattern.

Learning Outcomes: To learn Various Design Patterns and learn their application in real software development..

BOOKS RECOMMENDED:

- [1]. Gamma, Helm, Johnson, Vlissides, Design Patterns. Elements of Reusable Software., Pearson Education 2006
- [2]. Cooper, J. W., Java Design Patterns, A Tutorial, Pearson Education, 2000.
- [3]. Freeman, Freeman, Head First Design Patterns, O'Reilly Pub. 2007
- [4]. Mark Grand, Patterns in Java Vol. 1, Wiley 2002
- [5]. Mark Grand, Patterns in Java Vol. 2, Wiley 2002
- [6]. Mark Grand, Patterns in Java Vol. 3, Wiley 2002
- [7]. Douglas Schmidt, Pattern Oriented Software Architecture Voll, John Wiley 2000, also called as POSA

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN SOFTWARE
ENGINEERING
5CO251/5CO281 – DESIGN PATTERNS**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO251/5CO281 - Design Patterns	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective:

To strengthen the knowledge of Object Oriented Design and Development by understanding various design patterns.

Prerequisites:

Knowledge of object oriented system concepts, object oriented analysis and modeling and object oriented programming.

CONTENTS

UNIT I

Introduction to Software Patterns, Overview of UML, Class Diagrams, Collaboration Diagrams, State chart Diagram, Deployment Diagram, Fundamental Design Patterns: Delegation, Interface, Abstract Super-class, Interface and Abstract class, Immutable, Marker Interface

UNIT II

Simple Factory pattern, Factory Method, Abstract Factory, Builder, Prototype, Singleton

UNIT III

Adaptor, Bridge, Composite, Façade, Flyweight, Decorator, Proxy Pattern

UNIT IV

Chain of Responsibility, Command, Interpreter, Mediator, Memento Pattern

UNIT V

Observer, State, Strategy, Template Method, Visitor, Iterator Pattern

BOOKS RECOMMENDED

1. Gamma, Helm, Johnson, Vlissides, Design Patterns. Elements of Reusable Software., Pearson Education 2006
2. Cooper, J. W., Java Design Patterns, A Tutorial, Pearson Education, 2000.
3. Freeman, Freeman, Head First Design Patterns, O'Reilly Pub. 2007
4. Mark Grand, Patterns in Java Vol. 1, Wiley 2002
5. Mark Grand, Patterns in Java Vol. 2, Wiley 2002
6. Mark Grand, Patterns in Java Vol. 3, Wiley 2002
7. Douglas Schmidt, Pattern Oriented Software Architecture Vol 1, John Wiley 2000, also called as POSA

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP3G4	L	T	P	L	T	P	Total
Data Mining & Warehousing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objectives:

- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models.

Unit-I

Data Mining -Introduction: Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Knowledge Discovery in Databases (KDD), KDD Process, Data Preprocessing, Data Cleaning, Data Transformation, Data Compression and Dimension Reduction, Principal Component Analysis, Binning Methods.

Unit-II

Data Warehousing –Introduction and Design: Overview and Concepts: Need for data warehousing, basic elements of data warehousing, Architecture and Infrastructure: Architectural components, Infrastructure and metadata. Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling, data extraction, transformation and loading, data quality. OLAP in data warehouse –ROLAP, MOLAP, HOLAP. OLTP Vs OLAP, Various Data Warehouse Schemas.

UNIT-III

Association & Classification Techniques: Introduction, Frequent itemset mining methods –

Apriori, FP-Growth, Pattern evaluation methods, Basic concepts of classification, Decision tree induction, Bayes classification, Rule-based classification.

UNIT-IV

Clustering Techniques: Introduction, Clustering paradigms; Partitioning algorithms – K-Means, K-Medoid, CLARA; Partition based clustering – BIRCH; Density based clustering - DBSCAN; Categorical clustering algorithms, Evaluation of Clustering.

UNIT-V

Other DM techniques & Web Mining: Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends. Web Mining : Introduction Web content mining, Web structure Mining, Web Usage Mining.

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis.

Reference Books:

1. Data Mining Techniques; ArunK.Pujari ; University Press.
2. Data Mining Concepts and Techniques, Jiawei Han Micheline Kamber,Jianpei, Morgan Kaufmann.
3. Data Mining; Adriaans&Zantinge; Pearson education.
4. Mastering Data Mining; Berry Linoff; Wiley.
5. PaulrajPonniah, “Data Warehousing Fundamentals”, John Wiley.
6. Text Mining Applications, Konchandy, Cengage

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
SEP4C6 Software Testing & QA	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives: To develop a skill in developing good quality in the software product.

Pre requisites: Basic knowledge of software Engineering and programming.

COURSE CONTENTS

UNIT-I

SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics – Various software development Life cycles (SDLC) –Principles of testing.

UNIT-II

WHITE BOX TESTING White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis

UNIT-III

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing- Integration Testing

UNIT-IV

TESTING STRATEGIES: System testing - Functional testing-non-Functional testing-acceptance testing-performance testing –Factors and Methodology for Performance testing, Regression testing-Methodology for Regression-testing.

UNIT-V

ADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING): Syntax testing - Finite state testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

Learning Outcomes: To learn to Software Testing & QA concepts and its approaches to software Testing and QA.

BOOKS RECOMMENDED:

- [1]. Srinivasan Desikan&Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education, 2006
- [2]. R. Patton; Software Testing; Techmedia (SAMS) 2000
- [3]. GlenfordJ.Myers, " The Art of Software Testing ", John Wiley & Sons, 1979.
- [4]. Boris Beizer, Black-Box Testing: “Techniques for Functional Testing of Software and Systems ", John Wiley & Sons, 1995.
- [5]. P.C.Jorgensen, “Software Testing - A Craftsman’s Approach ", CRC Press, 1995.

**M.E. (COMPUTER ENGINEERING) SPECIALIZATION IN
SOFTWARE ENGINEERING
5CO257/5CO287 - SOFTWARE TESTING & QUALITY ASSURANCE**

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5C0257/5CO287 SOFTWARE TESTING & QUALITY ASSURANCE	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective: To develop a skill in developing good quality in the software product.

UNIT I:

SOFTWARE TESTING PRINCIPLES: Need for testing - Psychology of testing - Testing economics – Various software development Life cycles (SDLC) –Principles of testing.

UNIT II:

WHITE BOX TESTING: White box testing techniques - Statement coverage - Branch Coverage - Condition coverage - Decision/Condition coverage - Multiple condition coverage - Dataflow coverage - Mutation testing - Automated code coverage analysis

UNIT III:

BLACK BOX TESTING: Black box testing techniques - Boundary value analysis - Robustness testing - Equivalence partitioning -Syntax testing - Finite state testing - Levels of testing – Unit testing- Integration Testing.

UNIT IV:

TESTING STRATEGIES: System testing - Functional testing-non-Functional testing-acceptance testing- performance testing –Factors and Methodology for Performance testing, Regression testing-Methodology for Regression testing.

UNIT V:

ADVANCE SOFTWARE TESTING METHOD (OBJECT ORIENTED TESTING):

Syntax testing - Finite state testing - Levels of testing - Unit, Integration and System Testing. Challenges - Differences from testing non-OO Software - Class testing strategies - State-based Testing Software quality Assurance: ISO 9000; CMM and Test Management Issues; Quality Assurance personnel Issues.

BOOKS RECOMMENDED

1. Srinivasan Desikan & Gopalswamy Ramesh “Software testing Principles and Practices” Pearson education,2006
2. R. Patton; Software Testing; Techmedia (SAMS)2000.
3. Glenford J.Myers, " The Art of Software Testing ", John Wiley & Sons,1979.
4. Boris Beizer, Black-Box Testing: " Techniques for Functional Testing of Software and Systems ",John Wiley & Sons,1995.
5. P.C.Jorgensen, " Software Testing - A Craftman's Approach ", CRC Press,1995.
6. Robert V.Binder, " Testing Object-Oriented Systems: Models Patterns and Tools ", Addison Wesley,2000.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP4E4	L	T	P	L	T	P	Total
Speech andLanguageProcessing	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Objective: To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Prerequisite: Discrete structures, Finite automata, information retrieval and Context-free Grammar

COURSE CONTENTS

UNIT I

Natural Language Processing, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNIT II

Computational Phonology: speech sound, phonetic transcription, text to speech; Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-grams.

UNIT III

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNIT IV

Syntax Processing: Parsing with CFG, CKY parsing and the Earley parser, Probabilistic parsing; Semantic Processing: Meaning representation, First Order Predicate Calculus. **Lexical Semantics: Internal structure of words, thematic roles, Primitive decomposition, WordNet.**

UNIT V

Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

TEXTBOOKS:

- [1] D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.
- [2] 2. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",
- [3] James Allen. "Natural Language Understanding", Addison Wesley, 1994.

List of Assignment in NLP Lab:

Problem based on Stemming Algorithm.

Problem based on Part of Tagging.

Problem based on Parsing.

Problem based on Information Retrieval.

Case study on Different NLP Techniques

Cricket Game Prediction.

Machine Translation from English-Hindi.

Query Expansion for Information Retrieval.

Emotion detection for texts.

Any other problem based on emerging trends in speech & language processing.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
	L	T	P		TH	CW	SW	PR	Total
5CO206/5CO236 Speech and Language Processing									
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective:

To gain the knowledge for developing advanced technology of computer systems like speech recognition and machine translation.

Prerequisite:

Discrete structures, Finite automata, Context-free Grammar

CONTENTS

UNIT I:

Natural Language Processing, Applications, Ambiguity, Morphology, Parsing with Finite State Transducers, Regular Expressions, Stemmer, Spelling errors.

UNIT II:

Computational Phonology: speech sound, phonetic transcription, text to speech; Pronunciation Variations, Bayesian Method to spelling and pronunciations, Minimum Edit Distance, Weighted Automata, N-Grams for ~~spelling and pronunciation~~.

UNIT III:

HMM and speech recognition, Viterbi algorithm, Acoustic processing of speech, Feature Extraction, Speech Synthesis; Part-of-Speech Tagging: rule based, stochastic, transformation based.

UNIT IV:

Syntax Processing: Parsing with CFG, Earley Parsing, Probabilistic Parsing, CYK algorithm; Semantic Processing: Meaning representation, First Order Predicate Calculus, ~~Semantic augmentation of CFG rules~~, Semantic grammar, ~~Idioms and compositionality~~.

UNIT V:

Lexical Semantics: Internal structure of words, Thematic roles, ~~Primitive decomposition~~, Word Net; Word sense disambiguation; Information Retrieval: Vector space model, Improving user queries; Pragmatic Processing: Discourse; Natural Language Generation, Machine Translation.

BOOKS RECOMMENDED

- [1] D. Jurafsky and J.H. Martin; Speech and Language Processing; Processing; Prentice Hall; 2000.
- [2] J. Allen, Natural Language Understanding; Benjamin Cummings; 1995

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year M.E. (Computer Engineering Sp. in Software Engineering) (Part Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
SEP4E6	L	T	P	L	T	P	Total
Machine Learning	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information. The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

Pre requisites: Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

COURSE OF CONTENTS

Unit-I

Introduction: Definition, Applications of machine learning, Importance of machine learning, Aspects of developing a learning system: training data and test data, **Issues in machine learning, Types of learning: supervised, unsupervised and Reinforcement learning, Concept learning, General-to-specific ordering of hypotheses.** Version spaces and the candidate elimination algorithm.

Unit-II

Supervised Learning: **Classification and Regression learning methods,** Decision Tree Learning: Representing concepts as decision trees, ID3 algorithm. Picking the best splitting attribute, searching for simple trees and computational complexity. **Regression and function approximation, linear regression and best fit, Order of polynomial, Polynomial regression, Cross validation.**

Unit-III

Unsupervised Learning: **Introduction to unsupervised learning -Clustering -Classification of clustering algorithms: K-Means and EM -Factor Analysis: PCA (Principal Components Analysis) and ICA (Independent Component Analysis) -Self-Organized Maps (SOM) and Multi-dimensional Scaling.**

Unit-IV

Computational Learning theory, Introduction, PAC Learning, **VC dimension, Support Vector Machines (SVM),** Genetic Algorithm (GA), illustrative examples for SVM and GA.

Unit-V

Artificial Neural Networks Learning, Introduction, Neural Network Representation, Perceptron, Backpropagation algorithm, Examples of Neural Network Learning.

RECOMMENDED BOOKS

- [1] Tom Mitchell, *Machine Learning*, McGraw-Hill, 1997.
- [2] Richard O. Duda, Peter E. Hart & David G. Stork, *Pattern Classification*, Wiley & Sons, 2001.
- [3] Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press, 2004.
- [4] David E. Goldberg, *Genetic Algorithms in Search, Optimization and Machine Learning*, Kluwer Academic Publishers, Boston, MA, 1989.
- [5] Zbigniew Michalewicz, *Genetic Algorithms + Data Structures = Evolution Programs*, Springer, 1999.

Learning Outcomes:

Upon Completing the Course, students will have knowledge of various machine learning techniques useful for solving the real world problems.

List of Assignment in Machine Learning Lab:

Problem based on different machine Learning algorithm

Works on different machine learning Tools

Case Study on different data sets

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME.(Computer Engineering) (Sp. Software Engineering)					
Subject Code & Name	Instructions Hours Per Week			Marks					
5CO208/5CO238 Machine Learning	L	T	P		TH	CW	SW	PR	Total
Duration of Paper: 3 Hrs.	3	1	-	Max	100	50	-	-	150
				Min	50	25	-	-	75

Objective: To expose the students about automatic machine learning methodologies.

Prerequisite:

Computer Themes; Formal Language & Automata.

CONTENTS

UNIT-I

~~Introduction: Theoretical Approaches: Inductive Inference; Grammatical Inference; PAC Learning; Complexity of learning; Polynomial learn ability; VC-dimension~~

UNIT-II

~~Methodologies: Parametric Learning; Language learning; Explanation based learning; Learning using exemplars; Genetic algorithms; Learning in neural nets; Multi-strategy learning~~

UNIT-III

~~Automatic program construction from example computations; Inference of LISP and logic programs; Inference of decision trees and finite automata~~

UNIT-IV

~~Architecture of machine learning programs; ID5; C4.5 etc.~~

UNIT-V

Application of Machine learning to Data Mining and Knowledge Discovery.

BOOKS RECOMMENDED

- [1] Anthony M. and Biggs N.; Computational learning theory; Cambridge Univ. Pr. 1992.
- [2] Michalewicz Z.; Genetic Algorithms + Data Structures = Logic Programs; Springer; 1992.
- [3] Bergadano F. and Gunetti D.; Inductive Logic Programming; MIT Press; 1996.
- [4] Goldberg D.E.; Genetic Algorithms in Search; Optimization and Machine Learning; Addison- Wesley; 1989.
- [5] Ross Q.J.; C4.5; Programs for Machine Learning; Morgan Kaufmann; 1997.
- [6] U.M. Fayyad et. Al.; Knowledge Discovery and Data Mining; MIT Press; 1996.
- [7] Nilsson N J, Introduction to Machine Learning, eBook, 1996.

Devi Ahilya University, Indore, India Institute of Engineering & Technology				ME – I Year (Spl Digital Communication) Semester- B			
Subject Code & Name	Instructions Hours per Week			Credits			
ASP4S2: Soft Skill-2	L	T	P	L	T	P	Total
	2	-	-	2	-	-	2
Duration of Theory Paper: 3 Hours							

Objective: To learn about basic Life and Organizational skills.

Pre-requisites: Nil.

COURSE CONTENTS

Unit I

Perception & Learning

Perception: Importance of Perception, Factors influencing perception – Selective Perception, Halo effect, Projection, Stereotyping.

Learning : Defining & Importance, Theories of Learning – Behavioral, Cognitive & Social Learning, Learning Curves – Diminishing-returns, Increasing-returns & S Shaped. Reinforcement – Positive, Negative, Punishment & Extinction.

Unit II

Values, Attitude & Job Satisfaction

Values – Meaning, Importance & Types; Loyalty & Ethical Behaviour; Values across Cultures, Hofstede's Framework for assessing Cultures.

Attitude & Job Satisfaction – Meaning & Components of Attitude; Attitudes towards Job – Job Satisfaction, Job Involvement, Organizational Commitment; Job Satisfaction & Productivity, Absenteeism & Turnover; Attitudes & Consistency; Cognitive Dissonance Theory.

Unit III

Group Dynamics

Groups – Definition & Meaning , Stages & Process of Group Formation, types,

Work Group Behaviour – structure, factors affecting – Norms, Conformity, status, Groupthink, Group shift, Social Loafing, Production Blocking. Group Decision making techniques.

Unit IV

Team Building & Sustaining

Team : Meaning , Types & Process of Team- building, Characteristics of a Matrix, Organizational Matrix and Team work ,Conflict and Communication in teams , Effective Team Member and Team Relations , Successful Teams, Team Leadership, Team Performance - Evaluation and Rewarding System .

Unit V

Organizational Dynamics

Power & Politics : Bases of Power- Formal & Personal, Dependency- a key to Power, Contrasting Leadership & Power, Coalitions, Sexual Harassment, Power Tactics, Organizational Politics, Impression Management.

Organizational Culture – Organizational Structure, Work Specialization, Departmentalization, Chain of Command, Span of Control, Centralization & Decentralization. Organizational Culture & National Culture, Resistance to Change & Change Management.

BOOKS RECOMMENDED:

- [1] Stephen P. Robbins, Organizational Behaviour, Pearson Edu., 10th Ed., 2003.
- [2] R. D. Agarwal, Organization & Management, Tata McGraw-Hill Publishing Co.Ltd, 2007
- [3] Jit S. Chandan , Organizational Behaviour, Vikas Publishing House, 3rd Ed., 2006.
- [4] Stephen P. Robbins, Timothy A. Judge, Seema Sanghi, Organizational Behaviour, Dorling Kindersley (India) Pvt. Ltd., Pearson Edu., 2007.

- [5] Ramneek Kapoor, Managerial Skills, Pathmaker Bangalore, Nakoda Publishers & Printers, 1st Ed.
[6] Life Skills – Skills for Life: A handbook, International Federation of Red Cross and Red Crescent Societies Reference Centre for Psychosocial Support, Paramedia 1662, Denmark. 1st edition, 2013.