DEVI AHILYA VISHWAVIDYALAYA, INDORE

Institute of Engineering and Technology

1.1.1
Program outcome and course outcome

DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

List Of PO_PSO_CO

Electronics and Instrumentation

BE Programme
(Electronics and Instrumentation)
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

Programme Specific Outcomes of Various B.E Programme at IET-DAVV can be illustrated as:

a) .

1. Bachelor of Engineering (B.E) in Electronics and Instrumentation Engineering

a) PSO1: Ability to perform instrumentation and data acquisition in various process industries for better product development and improved quality.
b) PSO2: Ability to apply the concept for accurate and precise measurement of parameters for investigation and analysis in medical domain.
c) 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.
d) 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.
e) 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.
f) 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.

AMR1C1:
Applied Mathematics-I

Course 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.

ACR1C2:
Applied Chemistry & Environmental Science

Course 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.

MER1C3
Elements of Mechanical Engineering

Course Outcomes

- Upon Completing the Course, Student will able to:
- Understand basics of thermodynamics and components of steam.
- Identify engineering materials, their properties, manufacturing methods encountered in engineering practice.
- Understand basics of internal combustion engines.
- Understand functions and operations of welding, casting and machine tools including milling, shaping, grinding and lathe machines.

ETR1C4:
Basic Electronics

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- Students will be able to solve clipper and clamper circuits. They get the knowledge og op-amp and its various applications as integrator, differentiator and as an oscillator.

SSR1S1:
Technical English

Course 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.

AMR2C1:
Applied Mathematics-II

Course 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.

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Applied Physics

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- The student will demonstrate the ability to use concepts of Morden physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their applicable to obtain quantitative solutions of problems in physics.

MER2C3:

Engineering Drawing

Course 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.
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- 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.

COR2C5:
Computer Programming in C++

Course Outcomes-

Upon completing the course, students will be able to:

- To develop C++ programs using basic and advanced constructs that will solve real life problems.
- The course aims to understand the features of C++ supporting object-oriented programming.
- Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
- Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

SSR2S2:
Humanities

Course 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.

AER3C1
Applied Mathematics-III

Course 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 were analytical methods seems to fail, like solving highly nonlinear equation, numerical methods works very well.

EIR3C2
DIGITAL ELECTRONIC

Course 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 optimize 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.

EIR3C3
DATA STRUCTURE

Course 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.

EIR3C4
NETWORK ANALYSIS

Course Outcomes

Upon Completing the Course, Student will able to:

- Understand 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.

EIR3G1
ELECTRONIC DEVICE AND FABRICATION

Course Outcomes

Upon Completing the Course, Student will 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

EIR3L1 ELECTRONIC WORKSHOP-I

Course 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.

SIR3S3
EFFECTIVE COMMUNICATION SKILL

Course Outcomes
Upon Completing the Course, Student will able to deliver the seminars and making presentation

EIR4C1
COMPUTER ORGANIZATION AND ARCHITECTURE

Course 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

EIR4C2
ELECTRICAL AND ELECTRONIC MEASURMENT

Course 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

EIR4C3

ANALOG ELECTRONICS

Course 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.

EIR4C4
SENSOR AND TRANSDUCER

Course 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.

EIR4G2
SIGNAL&SYSTEMS

Course 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

EIR4L2
ELECTRONIC WORKSHOP II

Course 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.

SER4S4
ENGINEERING ECONOMICS

Course 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.

EIR5C1
OBJECT ORIENTED PROGRAMMING

Course 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

EIR5C2

ANALOG & DIGITAL COMMUNICATION

Course 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.

EIR5C3

Power Electronics

Course Outcomes
Upon Completing the Course, Student will able to:

- Design the Inverter, chopper, rectifiers for high voltage.
- Apply design concepts for industrial applications.

EIR5E1
MICROCONTROLLER

Course 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.

EIR5G3
DIGITAL SIGNAL PROCESSING

Course Outcomes
Upon Completing the Course, Student will be able to:

- 1.Understand the concept of fourier transform & fourier series.
- Acquire Knowledge and understanding of Filter design.
- Able to know the functioning of DSP processors.

EIR5L3
SOFTWARE WORKSHOP

Course Outcomes
Upon completing the course, Student would be able to:

- . Write Java based application programs
- Learn to apply the concepts relating to various topics

EIR6C1
VLSI Design

Course Outcomes
Upon completing the course, Student would be able to:

- 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.

EIR6C2

MEDICAL & ANALYTICAL INSTRUMENTATION

Course 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.

EIR6C3
CONTROL SYSTEM

Course 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.

EIR6E1
LINEAR INTEGRATED CIRCUIT

Course Outcomes

At the end of the course, students should be able to do the following:

- Operational Amplifier Fundamentals: Amplifier Fundamentals, The Operational Amplifier ,Basic Op Amp Configurations
- Active filters I: The Transfer Function, First-Order Active Filters, Standard Second-Order Responses, *KRC* Filters, Multiple-Feedback Filters, State-Variable and Biquad Filters
- Static Op Amp Limitation: Simplified Op Amp Circuit Diagrams, Input Bias and Offset Currents, Low-Input-Bias-Current Op Amps
- Designing- Adder, Subtractor, Integrator, Differentiator, Voltage follower

SER6S6

ENTREPRENEURSHIP DEVELOPMENT & IPR

Course 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.

EIR6G4

COMPUTER NETWORKS

Course 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.

EIR7P1
PROJECT PHASE -I

Course 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

EIR7C2
OPERATING SYSTEM

Course 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.

EIR7C3
INTELLIGENT INSTRUMENTATION SYSTEM

Course 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

EIR7C4
Process Instrumentation & Control

Course 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.

EIR7E1
CIRCUIT DESIGN USING HDL

Course 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

EIR7E3
SPEECH AND IMAGE PROCESSING

Course 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.

EIR8P2
PROJECT PHASE-II

Course 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

EIR8C1
EMBEDDED SYSTEM

Course Outcomes:

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

EIR8C2
OPTICAL INSTRUMENTATION

Course 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.

EIR8C3
INTERNET OF THINGS

Course 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.

EIR8E1
NETWORK SECURITY

Course 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.

EIR8E2
MACHINE LEARNING

Course Outcomes:

Upon Completing the Course,

- Students will have knowledge of various machine learning techniques useful for solving the real world problems.

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Programme Specific Outcomes

1. 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.

Learning Outcomes:
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- 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.

COR2C5:
Computer Programming in C++

Learning Outcomes:-

Upon completing the course, students will be able to:

- To develop C++ programs using basic and advanced constructs that will solve real life problems.
- The course aims to understand the features of C++ supporting object-oriented programming.
- Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
- Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

SSR2S2:
Humanities

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.

AVR3C1

APPLIED MATHEMATICS-III

Learning Outcomes:

Upon completing the course, students will be able to:

- Apply Laplace Transform methods, useful in problems where mechanical/electrical driving force has discontinuities, is impulsive or is a complicated periodic function.
- Learn how to apply Statistics in solving problems of modern Civil Engineering.
- 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.
- Learn that many problems were analytical methods seems to fail, like solving highly nonlinear equation, numerical methods works very well.

SVR3S3

LIFE MANAGEMENT SKILLS

Learning Outcomes:

Upon completing the course, students will be able to:

- Handle Stressful Situations
- Understand their priorities
- Cope with different Psychological Problems
- Find Real Happiness

VLR3C2
APPLIED MACHINES AND STRENGTH OF MATERIALS

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 structural Component.

VLR3C3
SURVEYING

Learning Outcomes:

- On the successful completion of this course the students will get a diverse knowledge of surveying practices applied for real life problems.
- 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.
- The knowledge of limits of accuracy will be obtained by making measurements with various surveying equipment employed in practice.

VLR3C4

CONSTRUCTION MATERIALS AND TECHNOLOGY

Learning Outcomes:

- Knowledge on properties of materials for concrete by suitable test and mix design of concrete.
- Compare the properties of most common and advanced building materials.
- Understand the typical and potential applications of these material.
- Understand the importance of experimental verification of material properties
- Will have understanding of different construction techniques, practices and equipments. They will be able to plan the requirements for substructure and superstructure a construction.

VLR3G1
STRUCTRUAL MECHANICS

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Learn behavior of different beams under different types of loading.
- Understand the basic concepts of columns and struts.
- Learn the distribution of stresses along a structural Component.
- Design the column & struts used in Mechanical as well as Civil Engineering.

AVR4C1

ENGINEERING GEOLOGY

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.

SVR4S4
COMMUNICATION SKILLS

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.

VLR4C2
FLUID MECHANICS -I

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 Bernouli 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

VLR4C3
ADVANCED SURVYING

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

VLR4C4

DESIGN OF RCC STRUCTURE-I

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.

VLR4G2

ENVIROMENTAL ENGINEERING-I

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.

VLR5C1

DESIGN OF RCC STRUCTURES-II

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.

VLR5C2

FLUID MECHANICS-II

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 Bernouli 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

VLR5C3
QUANTITY SURVEYING 7 COSTING

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

VLR5E1
GEOTECHNICAL ENGINEERING-I

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.

VLR5G3

WATER RESOURCE ENGINEERING

Learning Outcomes:

1 Various components of hydrologic cycle that affect the movement of water in the earth
2 Various Stream flow measurements technique
3 the concepts of movement of ground water beneath the earth
4 the basic requirements of irrigation and various irrigation techniques, requirements of the crops
5 Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design
6 Basic components of river Training works. CO- 7 Apply math, science, and technology in

SVR5S5
MANAGEMENT FOR ENGINEERS

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.

VLR6C1
STRUCTURAL ANALYSIS-I

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

VLR6C2
TRANSPORTATION ENGINEERING-I

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

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VLR6C3
DESIGN OF STEEL STRUCTURE-I

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

VLR6E1

GEOTECHNICAL ENGINEERS-II

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

VLR6G4
CONSTRUCTION PLANNING AND MANAGEMENT

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

VLR7C1
TRANSPORTATION ENGINEERING-II

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

VLR7C2
DESIGN OF STEEL STRUCTURE-II

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

VLR7E1
ENVIRONMENTAL ENGINEERINGE

Course Outcomes:

At the end of the course, the student 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.

VLR7G5
STRUCTRUAL ANALYSIS-II

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

VLR8C1
DESIGN OF HYDRAULIC AND IRRIGATION STRUCTURE

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Select hydraulic structural elements.
2. Evaluate surface water dam.
3. Integrate relevant concept and methodologies in the area of hydraulics,
4. To select the type of dam, design and to construct.

VLR8C2
BUILDING PLANNING & ARCHITECTURE

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.

VLR8E1
DISASTER MODELING AND MANAGEMENT

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.
- Develop a Disaster Management Systems (DMS) for regional and large scale.

VLR8E2
DESIGN OF PRE STRESSED CONCRETE ELEMENT

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.
- Design water tanks

VLR8E3
INSTRUMENTATION AND EXPERIMENTAL TECHNIQUE

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

VLR8E4
DESIGN OF EARTHQUAKE RESISTANT STRUCTURES

Learning Outcomes:

Upon Completing the Course, Student will able to:

- Implement new construction techniques on engineering concepts.
- Get a diverse knowledge of technology practices applied to real life problems.
- Select appropriate temporary structures/works.
- Understand, select and implement specialized repair and rehabilitation techniques.

VLR8G6
CONSTRUCTION TECHNIQUES

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.

DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

List Of_PO_PSO_CO (CBCS)
Computer Engineering

BE I Year-IV Year Programme

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 of Various B.E Programme at IET-DAVV can be illustrated as:

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1. **Bachelor of Engineering (B.E) in Computer Engineering**

a) 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.
b) 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.
c) 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.

AMR1C1:
Applied Mathematics-I

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.

ACR1C2:
Applied Chemistry & Environmental Science

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.

MER1C3
Elements of Mechanical Engineering

Learning Outcomes:

- Upon Completing the Course, Student will able to:
- Understand basics of thermodynamics and components of steam.
- Identify engineering materials, their properties, manufacturing methods encountered in engineering practice.
- Understand basics of internal combustion engines.
- Understand functions and operations of welding, casting and machine tools including milling, shaping, grinding and lathe machines.

ETR1C4:
Basic Electronics

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 og op-amp and its various applications as integrator, differentiator and as an oscillator.

SSR1S1:

Technical English

Course 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.

AMR2C1:
Applied Mathematics-II

Course 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.

APR2C2:
Applied Physics

Course Outcomes:

Upon Completing the Course, Student will able to:

- The student will demonstrate the ability to use concepts of Morden physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their applicable to obtain quantitative solutions of problems in physics.

MER2C3:

Engineering Drawing

Course 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.

EIR2C4:
Electrical Engineering

Course 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 bettr 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.

COR2C5:
Computer Programming in C++

Course Outcomes:

Upon completing the course, students will be able to:

- To develop C++ programs using basic and advanced constructs that will solve real life problems.
- The course aims to understand the features of C++ supporting object-oriented programming.
- Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
- Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

SSR2S2:
Humanities

Course 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.

ACR3C1
APPLIED MATHEMATICS – III

Course Outcomes:

Upon completing the course, students will be able to:

- Learn that many problems were analytical methods seems 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.

CER3C2
OBJECT ORIENTED PROGRAMMING

Course 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

CER3C3
DATA STRUCTURES

Course Outcomes:

Upon Completing the Course, Students 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

CER3G1
COMPUTER ORGANIZATION ARCHITECTURE

Course 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.

SCR3S3
Environmental Studies

Course Outcomes:

Upon completing the course, students will be able to

- 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.

CER3L1
Computer Hardware Lab

Course 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.

CER4C1
DISCRETE STRUCTURES

Course 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.

CER4C2
Operating Systems

Course Outcomes:

Upon completing the course, students will be able to:

- Learn the Concept of Process Management, Concepts of process
- Role of OS, Types of OS, Batch Systems;
- Process Synchronization and Deadlock, Process Co-operation
- Memory Management and File system, Paging, Segmentation and Contiguous memory allocation.
- Disk management and other issues, Disk management, Disk Structure and Scheduling

CER4C3
Abstraction and Paradigms for Programming

Course Outcomes:

Upon completing the course, students will be able to:

- Functional Programming, Logic Programming, Parallel Programming, Concurrent Programming.
- Database Access, Multithreading, Web programming with Python, Web Scraping,
- Input, Output, Forward, Bidirectional, Random Access.

CER4C4
DATBASE MANAGEMENT SYSTEMS

Course 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.

CER4G2
DIGITAL SIGNAL PROCESSING

Course Outcomes:

Upon completing the course, students will be able to:

- Signal processing, discrete time signals and sequence operation
- Fourier transform, condition of their convergence, symmetry properties of FT, Fourier transform theorems.
- sampling the FT, Fourier representation of finite duration sequences

CER4L2
Hands-on Android Programming

Course Outcomes:

Upon completing the course, students will be able to:

- Learn about Android UI – Working with buttons & other components.
- Learn about Android Service & Data Storage – Introduction, Android service API, Android service life cycle.
- Learn about Android APIs & Connectivity – Overview of TextToSpeech API.

SCR4S4
ENGINEERING ECONOMICS

Course 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.

CER5C1
Theory of Computation

Course Outcomes:

Upon completing the course, students 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 and engineering application like designing the compilers.
- Have an understanding of the solvable and unsolvable problems and their computational behaviors.

SER5C2
SOFTWARE ENGINEERING

Course Outcomes:

Upon completing the course, students will be able to:

- 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

ITR5C3
COMPUTER NETWORK

Course Outcomes:

Upon completing the course, students will be able 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.

CER5G3
Object Oriented Analysis &Design

Course Outcomes:

Upon completing the course, students 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

CER5L3
Software Laboratory

Course Outcomes:

Upon completing the course, students will be able to:

- 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.

CER5P1
Server Side Programming

Course Outcomes:

Upon completing the course, students will be able to:

- Learn about HTML tags, HTML forms. HTTP protocol: HTTP request, HTTP response.
- Learn about Session tracking with JAVA Servlet API.
- Learn about Cookies, Hidden Form Field, URL Rewriting, Session tracking with JAVA Servlet API.
- Learn about Basic of JSP: Life Cycle of JSP, JSP API. Scripting Elements:

SER5S5
Engineering Leadership

Course Outcomes:

Upon completing the course, students will be able to:

- Experiential Learning to Enhance Knowledge, Skills and Attitudes
- Built on this foundation, five pillars represent the core elements of the curriculum:
- Leadership Capabilities
- Product Development
- Scientific Foundations
- Challenge Project

CER6C1
Computer Graphics

Course Outcomes:

Upon completing the course, students will be able to:

- 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

CER6C2
Design and Analysis of Algorithms

Course Outcomes:

Upon completing the course, students will 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.

CER6C3
Compiler Technique

Course 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.

CER6E1
Data Warehousing & Mining

Course Outcomes:

Upon completing the course, students will 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.

CER6G4
Wireless and Mobile Networks

Course Outcomes:

Upon completing the course, students will be able to:

- 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.

SCR6S6
Professional Development

Course Outcomes:

Upon completing the course, students will be able to:

- 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.

CER7C1
Distributed Computing

Course Outcomes:

Upon completing the course, students will 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

CER7C2
Cloud Computing

Course Outcomes:

Upon completing the course, students will be able to:

- Introduce the broad perceptive of cloud architecture and model
- Apply different cloud programming model 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

CER7C3

Artificial Intelligence

Course 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 PrologProgramming to program intelligent systems.

CER7E1
Machine Learning

Course Outcomes:

Upon completing the course, students will be able to:

- Applications of machine learning, Importance of machine learning
- Classification and Regression learning methods**,** Decision Tree Learning
- Unsupervised learning -Clustering -Classification of clustering algorithms

CER8C1

Information Retrieval & Extraction

Course 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 performanve and effectiveness of Information Retrieval System.
- Have understanding of working of Web Search system.
- Understand Information Extraction task.

CER8C2
NETWORK & INFORMATION SECURITY

Course Outcomes:

Upon completing the course, students will be able 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.

CER8C3
Data Sciences

Course Outcomes:

Upon completing the course, students will 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 e ffective visualization of given data, reason around ethical and privacy issues in data science conduct and apply ethical practices.

CER8E1
Soft Computing

Course Outcomes:

Upon completing the course, students will be 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.

DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

List of PO_PSO_CO

BE Programme
(Electronics &Telecommunication)
Effective from July 2015

INSTITUTE OF ENGINEERING & TECHNOLOGY
(www.iet.dauniv.ac.in)

DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

List of PO_PSO_CO

B.E Programme (CBCS)
(ELECTRONICS & TELECOMMUNICATION ENGINEERING)

INSTITUTE OF ENGINEERING & TECHNOLOGY
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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 Electronics and Telecommunication Engineering**

a) 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.
b) 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.
c) 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.

AMR1C1:
Applied Mathematics-I

COURSE 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.

ACR1C2:
Applied Chemistry & Environmental Science

COURSE 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.

MER1C3
Elements of Mechanical Engineering

COURSE OUTCOMES:

- Upon Completing the Course, Student will able to:
- Understand basics of thermodynamics and components of steam.
- Identify engineering materials, their properties, manufacturing methods encountered in engineering practice.
- Understand basics of internal combustion engines.
- Understand functions and operations of welding, casting and machine tools including milling, shaping, grinding and lathe machines.

ETR1C4:
Basic Electronics

COURSE 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 og op-amp and its various applications as integrator, differentiator and as an oscillator.

SSR1S1:
Technical English

COURSE 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.

AMR2C1:
Applied Mathematics-II

COURSE 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.

APR2C2:
Applied Physics

COURSE OUTCOMES:

- The student will demonstrate the ability to use concepts of Morden physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their applicable to obtain quantitative solutions of problems in physics.

MER2C3:
Engineering Drawing

COURSE 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.

EIR2C4:
Electrical Engineering

COURSE 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 bettr 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.

COR2C5:
Computer Programming in C++

COURSE OUTCOMES:-

Upon completing the course, students will be able to:

- To develop C++ programs using basic and advanced constructs that will solve real life problems.
- The course aims to understand the features of C++ supporting object-oriented programming.
- Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
- Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

SSR2S2:
Humanities

COURSE 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.

ATR3C1
APPLIED MATHEMATICS-III

COURSE 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, and power transmission.
- Learn that many problems were analytical methods seems to fail like solving highly nonlinear equation.

ETR3C2
DIGITAL ELECTRONICS

COURSE 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.

ETR3C3
DATA STRUCTURE

COURSE 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.

ETR3C4
NETWORK ANALYSIS

COURSE 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.

ETR3G1

ELECTRONIC DEVICES AND FABRICATION

COURSE 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

ETR3L1

ELECTRONIC WORKSHOP-I

COURSE 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.

STR3S3

EFFECTIVE COMMUNICATION SKILL

COURSE 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)

ETR4C1

COMPUTER ORGANIZATION AND ARCHITECTURE

COURSE 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

ETR4C2

ELECTRICAL AND ELECTRONIC MEASURMENT

COURSE 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

ETR4C3
ANALOG ELECTRONICS

COURSE 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.

TR4C4
ANALOG COMMINICATION

COURSE 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.

)

ETR4G2

SIGNALS AND SYSTEMS

COURSE 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

STR4S4
ENGINEERING ECONOMICS

COURSE 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.

ETR5C1

OBJECT ORIENTED PROGRAMMING

COURSE 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

ETR5C2
DIGITAL COMMUNICATION

COURSE 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.

)

ETR5C3
TRANSMISSION LINE

COURSE 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.

ETR5E1
MICROCONTROLLERS

COURSE OUTCOMES:

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.

ETR5E2
RANDOM PROCESS

COURSE 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.

ETR5E3
SMART SENSOR AND MEMS

COURSE 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.

ETR5E4
ARTIFICIAL INTELLIGENCE

COURSE OUTCOMES:

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

ETR5E5
POWER ELECTRONICS

COURSE OUTCOMES:

Upon Completing the Course, Student will able to:

- Design the Inverter, chopper, rectifiers for high voltage.
- Apply design concepts for industrial applications.

STR5S5

PRINCIPLES OF MANAGEMENT

COURSE 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 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.

ETR5G3
DIGITAL SIGNAL PROCESSING

COURSE OUTCOMES:

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.

ETR5L3
SOFTWARE WORKSHOP

COURSE OUTCOMES:

Upon completing the course, Student would be able to:

- Write Java based application programs
- Learn to apply the concepts relating to various topic

ETR6C1
VLSI DESIGN

COURSE 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.

ETR6C2
MOBILE AND WIRELESS COMMUNICATION

COURSE 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.

ETR6C3
CONTROL SYSTEM

COURSE OUTCOMES:

Upon Completing the Course, Student will able to:

- Understand the concept of LTI control systems, Importance of feedback in CS and stabil-ity concept.
- Able to Design a Stable Control System
- Understand the difference between Linear and Digital Control Systems.

ETR6E4
INDUSTRIAL AND MEDICAL ELECTRONICS

COURSE 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.
- Study & understand the fundamentals of medical & laboratory instrumentation. Understanding of various Industrial transducers.

ETR6E5
MODELING AND SIMULATION

COURSE OUTCOMES:

- Upon Completing the Course, Student will able to:
- Describe basic characteristics of systems, and illustrate these descriptions using simple examples.
- Distinguish between modelling methods that are suitable for continuous-time, discrete-time, discrete-event, and hybrid systems, and apply these methods to simple systems.
- Build performance metrics into a system model and interrogate these metrics to appraise the performance of different system configurations or designs.
- Use industry-relevant simulation tools to model the performance of semi-realistic case study systems.

- Organise a modelling and simulation workflow, and apply a workflow to address

STR6S6
ENTERPRENEURSHIP AND IPR DEVELOPMENT

COURSE 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.

ETR6G4
COMPUTER NETWORKS

COURSE 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.

ETR6L4
DESIGN WORKSHOP

COURSE OUTCOMES:

Upon completing the course, Student would be able to:

- Design basic Analog and Digital circuit, PCB layput and use of EDA tool.

ETR7C1
PROJECT PHASE -I

COURSE 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

ETR7C2
OPERATING SYSTEM

COURSE OUTCOMES:

Upon Completing the Course, Student will able to learn:

a. Understands the different services provided by Operating System at different level. They learn real life applications of Operating System in every field.

b. Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.

c. They will learn different memory management techniques like paging, segmentation and demand paging etc.

ETR7C3
ANTENNA AND WWAVE PROPOGATION

COURSE OUTCOMES:

Upon completing the course, student will able to grasp the fundamental concept of antenna and its radiation mechanism.

ETR7C4
RF AND MICROWAVE ENGINEERING

COURSE OUTCOMES:

After learning the course the students should be able to:

a. Understand the basic concepts of microwave and its devices and components.

b. Apply the knowledge of microwave to solve the microwave communication and microwave application based problems.

c. Apply this knowledge for research in the field of microwave engineering.

ETR7E1

CIRCUIT DESIGN USING HDL

COURSE 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

ETR7E2 WIRELESS ADHOC AND SENSOR NETWORKS

ETR7E3

EMBEDDED SYSTEM

COURSE OUTCOMES:

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

ETR7E4

INDURSTIAL COMMUNICATION

COURSE 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.

ETR7E5

SPEECH AND IMAGE PROCESSING

COURSE 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.

ETR8P2
PROJECT PHASE-II

COURSE 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

ETR8C1
TELECOM NETWORKS

COURSE 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.

ETR8C3
SATELLITE AND NAVIGATION SYSTEM

COURSE OUTCOMES:

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.

ETR8E1
INTERNET OF THINGS

COURSE OUTCOMES:

At the end of the course, the students would be:

a. Interpret the impact and challenges posed by IoT networks leading to new architectural models.

b. Compare and contrast the deployment of smart objects and the technologies to connect them to network.

c. Appraise the role of IoT protocols for efficient network communication. Elaborate the need for Data Analytics and Security in IoT.

d. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

ETR8E2
NETWORK SECURITY

COURSE 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.

ETR8E3
ELECTROMAGNETIC INTERFERENCE AND ELECTROMEGNATIC COMPATIBILITY

Course Outcome:

After learning the course the students should be able to know about:

- EMI Environment
- EMI Coupling and Measurements
- EMI control techniques and standards

ETR8E4
DBMS and DATA ANALYTICS

COURSE 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.
-

ETR8E5
MACHINE LEARNING

- ## COURSE OUTCOMES:

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

DEVI AHILYA VISHWAVIDYALAYA, INDORE

FACULTY OF ENGINEERING

List of PO_PSO_CO (CBCS)

BE Programme
(INFORMATION TECHNOLOGY)
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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 Information Technology

a) PSO1: Impart capabilities to apply fundamental and advanced computing concepts.
b) PSO2: Use of capabilities for analysis, design, development and management of information processing solution(s) in solving real life problem(s).
c) PSO3: Capacity to adapt with continuous technological upgradations in domain of Information Technology.
d) 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.

AMR1C1:
Applied Mathematics-I

Course 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.

ACR1C2:
Applied Chemistry & Environmental Science

Course 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.

MER1C3
Elements of Mechanical Engineering

Course Outcomes:

- Upon Completing the Course, Student will able to:
- Understand basics of thermodynamics and components of steam.
- Identify engineering materials, their properties, manufacturing methods encountered in engineering practice.
- Understand basics of internal combustion engines.
- Understand functions and operations of welding, casting and machine tools including milling, shaping, grinding and lathe machines.

ETR1C4:

Basic Electronics

Course 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 og op-amp and its various applications as integrator, differentiator and as an oscillator.

SSR1S1:
Technical English

Course 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.

AMR2C1:
Applied Mathematics-II

Course 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.

APR2C2:
Applied Physics

Course Outcomes:

- The student will demonstrate the ability to use concepts of Morden physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their applicable to obtain quantitative solutions of problems in physics.

MER2C3:
Engineering Drawing

Course 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.

EIR2C4:
Electrical Engineering

Course 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 bettr 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.

COR2C5:
Computer Programming in C++

Course Outcomes:-

Upon completing the course, students will be able to:

- To develop C++ programs using basic and advanced constructs that will solve real life problems.
- The course aims to understand the features of C++ supporting object-oriented programming.
- Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
- Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

Humanities

Course 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.

AIR3C1
DISCRETE MATHEMATICS

Course 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.

ITR3C2
OBJECT ORIENTED PROGRAMMING

Course 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

ITR3C3
DATA STRUCTURE

Course 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.

ITR3C4
DIGITAL ELECTRONICS

Course 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

ITR3G1
COMPUTER ORGANISATION &ARCHITECTURE

Course Outcomes:

1. 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.

ITR3L1
COMPUTER HARDWARE LAB

Course 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.

SIR3S3
LIFE MANAGEMENT SKILLS

Course Outcomes:

Upon completing the course, students will be able to:

Handle Stressful Situations Understand their priorities Cope with different Psychological Problems Find Real Happiness.

AIR4C1
NUMERICAL AND OPTIMIZATION TECHNIQUES

Course Outcomes:
Upon completing the course, students will be able to:

- Learn that many problems were analytical methods seems to fail, like solving highly nonlinear equation, numerical methods works very well.
- Use the optimization techniques to provide a mathematical model to represent complex functional relationships.

ITR4C2
OPERATING SYSTEM

Course 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.

ITR4C3
Software engineering

Course 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

ITR4C4
DATABASE MANAGEMENT SYSTEM

Course 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

ITR4G2
DIGITAL COMMUNICATION ENGINEERING

Course 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.

ITR4L2
SMART SYSTEM

Course 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.

SIR4S4
COMMUNICATION SKILLS

Course 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.

ITR5C1
THEORY OF COMPUTATION

Course 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 and engineering application like designing the compilers.
- Have an understanding of the solvable and unsolvable problems and their computational behaviors.

ITR5C2
OBJECT ORIENTED ANALYSIS & DESIGN

Course 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

ITR5C3
COMPUTER NETWORK

Course 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.

ITR5G3
APPLIED STATISTICS

Course 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.

ITR5E1
WEB TECHNOLOGY

Course 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

ITR5L3
SCRIPTING LANGUAGE PROGRAMMING

Course Outcomes:

After completion of the course students will be able to –

- Apply scripting language programming skills for modern computing requirements.

SIR5S5
PRINCIPLES OF MANAGEMENT

Course 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.

ITR5E2
UNIX AND SHELL PROGRAMMING

Course 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 lean the shell scripts.
- Use the shell scripts in designing a programs for engineering problems.

ITR5E4
DISTRIBUTED OPERATING SYSTEM

Course 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 indeveloping 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.

ITR6C1
WIRELESS PROTOCOLS AND MOBIEL NETWORKS

Course 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.

ITR6C2
DESIGN AND ANALYSIS OF ALGORITHM

Course 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

ITR6C3
NETWORK & INFORMATION SECURITY

Course 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 Course Outcomes 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.

ITR6E1
SOFTWARE TESTING & QUALITY ASSURENCE

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Course Outcomes:

Upon completing the course, students will be:

- Familiar with software testing tools and techniques, and software quality assurance processes.

- Perform automation testing using selenium & QTP 10.0(UFT).

- Execute mobile app testing using Appium, calabash, MonkeyTalk, Robotium, Eggplant.

ITR6G4
COMPILER DESIGN

Course 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.

ITR6L4
MOBILE TECHNOLOGY LAB

Course 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.

SIR6S6
ENTERPRENURSHIP DEVELOPMENT&IPR

Course 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.

ITR7C1
CLOUD COMPUTING

Course 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

ITR7C2
COMPUTER GRAPHICS

Course Outcomes:

Upon completing the course, students will be able to:

- Able to learn the basics of2D/3D design and it 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.

ITR7E1
BIG DATA ANALYTICS

Course 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.

ITR7G5
ARTIFICIAL INTELLIGENCE

Course 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.

ITR8C1
DATA WARE HOUSING AND MINING

Course Outcomes:

- Upon Completing the Course, students will have knowledge of Data Warehousing and various Data Mining Algorithm useful for solving the real world problems.

ITR8C2
HUMAN COMPUTER INTERACTION

Course Outcomes:

- Evaluate the usability of a computer- based system using the concepts studied with respect to HCI
- Integration of HCI concerns in the software development process

ITR8E1
MACHINE LEARNING

Course Outcomes:

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

ITR8G6
PRINCIPLES OF MOBILE COMPUTING

Course Outcomes:

- Upon Completing the Course, students will gain the knowledge of various issues involved in mobile computing environment and techniques to resolve.

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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.

AMR1C1:
Applied Mathematics-I

Course 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.

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Applied Chemistry & Environmental Science

Course Outcomes
Upon completing the course, students will be able to:

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- 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.

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Elements of Mechanical Engineering

Course Outcomes

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- Understand basics of thermodynamics and components of steam.
- Identify engineering materials, their properties, manufacturing methods encountered in engineering practice.
- Understand basics of internal combustion engines.
- Understand functions and operations of welding, casting and machine tools including milling, shaping, grinding and lathe machines.

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Basic Electronics

Course 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 og op-amp and its various applications as integrator, differentiator and as an oscillator.

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Technical English

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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.

AMR2C1:
Applied Mathematics-II

Course 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.

APR2C2:
Applied Physics

Course Outcomes

- The student will demonstrate the ability to use concepts of Morden physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their applicable to obtain quantitative solutions of problems in physics.

MER2C3:
Engineering Drawing

Course 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.

EIR2C4:
Electrical Engineering

Course 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 bettr 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.

COR2C5:
Computer Programming in C++

Course Outcomes-
Upon completing the course, students will be able to:

- To develop C++ programs using basic and advanced constructs that will solve real life problems.
- The course aims to understand the features of C++ supporting object-oriented programming.
- Apply the major object-oriented concepts to implement object-oriented programs in C++ i.e. encapsulation, inheritance and polymorphism.
- Understand advanced features of C++ specifically friends, pointers, virtual functions and operator overloading.

SSR2S2:
Humanities

Course 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.

AMR3C1
APPLIED MATHEMATICS-III

Course Outcomes
Upon completing the course, students will be able to:

- Apply Laplace Transform methods, useful in problems where mechanical/electrical driving force has discontinuities, is impulsive or is a complicated periodic function.
- The course aims at developing the fundamentals of Complex Analysis, applicable to potential theory useful in steady state conduction, electrostatic and gravitational fields.
- 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.
- Learn that many problems were analytical methods seems to fail, like solving highly nonlinear equation, numerical methods works very well.

MER3C2
STRENGTH OF MATERIALS

Course 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.

MER3C3
MATERIAL SCIENCE

Learning Outcomes :
After Completing the Course, Student will be able to:

- Have the knowledge of materials.
- Understand the mechanical properties of materials.
- Know about the development of new materials having comparable properties.
- Consider the "cradle-to-grave" life cycle of materials relative to machine design and manufacturing processes.

MER3C4
MANUFACTURING PROCESS

Learning Outcomes :
Upon Completing the Course, Student will able to:

- Identify the processes used for the manufacturing of components of various sizes and shapes.
- 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.
- Select the tooling and the process parameters for the processing of common engineering work materials.
- 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.

MER3G1
APPLIED THERMODYANAMICS

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Course 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

MER3L1
WORKSHOP/PRACTICALS SEMINAR

Course 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

SMR3S3
EFFECTIVE COMMUNICATION SKILLS

Course 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.

MER4C1
INDURSTRIAL ENGG.& MANAGEMENT

Course 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.

MER4C2
THEORY OF MACHINES

Course 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.

MER4C3
MACHINE DESIGN & DRAWING

Course 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.

MER4C4
FLUID MECHANICS

Course 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)

MER4G2

MECHNOTRONIC

Course 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.

MER4L2
WORKSHOP /PRACTICALS
MECHATRONICS

Course Outcomes

Upon completing the course, student will able to:

- Acquire the basic understanding of the characteristics of various sensors and tranducers 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.

SMR4S4
ENGINEERING ECONOMICS

Course 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.

MER5C2
MACHINE DESIGN-I

Course 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

MER5C1
DYANAMICS OF MACHINE

Course 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.

MER5C3
HEAT TRANSFER

Course 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

MER5C4
IC ENGINE AND JET PROPULSION

Course Outcomes

Upon Completing the Course, Student will be 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.

MER5G1
PRODUCTION ENGINEERING-I

Course 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.

MER5L3
WORKSHOP /PRACTICALS
MACHINE DESIGN-I

Course 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.

SMR5S5

PRINICIPLES AND PRACTICE OF MANAGEMENT

Course 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.

MER6C1
MACHINE DESIGN -II

Course 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.

MER6C2
PRODUCTION ENGINEERING-II

Course 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.

- measure the forces generated at the chip tool interface during machining operations.

MER6C3
FLUID MACHINE

Course 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).

MER6C4
ENERGY CONVERSION SYSTEM

Course 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.

MER6G1
MATERIALS MANAGEMENT

Course Outcomes

Upon Completing the Course, Student will able:

- To understand the basics of Material handling techniques used in industries.
- To understand the basics of purchase procedure and its management.
- To understand the basics of stores and inventory management techniques used in industries. An overview of supply chain management.

MER6L4
WORKSHOP /PRACTICAL
MACHINE DESIGN -II

Course 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.

SMR6S6
ENTREPRENEURSHIP DEVELOPMENT & IPR

Course 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.

MER7C1
OPERATION RESERCH

Course 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.

MER7C2
MACHINE DESIGN -III

Course 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.

MER7C3
REFRIGERATION AND AIR- CONDITIONING

Course 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.

MER7E1
SQC&TQM

Course 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.

MER7E2
ARTIFICIAL INTELLIGENCE

Course 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.

MER7E3
ROBOTICS

Course 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.

MER7E4
TRIBOLOGY

Course 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.

MER7E5
COMPUTATIONAL FLUID DYNAMICS

Course 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.

MER8C1
PRODUCTION & OPERATION MANAGEMENT

Course 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.

MER8C2
VIBRATION & NOISE CONTROL

Course Outcomes
Upon completing the course student will be able to:
- Understand the basic phenomenon of Vibration and Noise.
- Find the natural frequency of different mechanical systems.
- Find out the performance of viscous dampers in force vibration system.
- Correlate the Mechanical and Electrical System.
- Control the noise from the Mechanical System.

MER8C3
AUTOMOBILE ENGINEERING

Course 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.

MER8E1
CAD/CAM

Course 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.

MER8E2
RELIABILITY ENGINEERING

Course Outcomes
Upon completing the course student will be able to:

- Understand the fundamentals of product cycle.
- Apply techniques of demand forecasting in practical situations.
- Understand the phenomenon of prototype product
- Know the basics of techniques related product development.
- Know the various standard procedures related to patenting, environmental and other standards for product appraisal

MER8E3
PRODUCT DEVELOPMENT

Course Outcomes

Upon Completing the Course, Student will able to:

- . Understand the principal of Reliability.
- Understand the design optimization of mechanical component.
- 1Understand the Weibull analysis, dimensioning.

MER8E4
POWER PLANT ENGINEERING

Course 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.

MER8E5

GAS DYNAMICS

Course 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

DEVI AHILYA VISHWAVIDYALAYA, INDORE
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FACULTY OF ENGINEERING

List Of PO_PSO_CO (CBCS)

M.Sc. (Applied Mathematics)
(Specialization in Computing & Informatics)
Batch 2015– 2016 and onwards

(www.iet.dauniv.ac.in)

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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.	AM1GE**x**	**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.	AM2EC**x**	**Discipline Elective I**	3-0-0	Disc. Elec.
5.	AM2EM**x**	**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.	AM3GE**x**	**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.	AM4EC**x**	**Discipline Elective III ***	3-0-0	Disc. Elec.
5.	AM4EM**x**	**Discipline Elective IV ***	3-0-0	Disc. Elec.
6.	AM4D**xx**	**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	

* Student will select either **Discipline Elective III and IV or Discipline Elective V.** Internal evaluation of Dissertation work will be based on monthly Seminars (showing progress of work done) and Attendance of students. Final marking will be a combination of Internal and External evaluation.

AM1PC1: Algebra

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.

AM1PC2: Discrete Mathematics

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.

AM1PC3:
Numerical Analysis/Integral

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.

Advanced Communication Skill

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.

Computer Architecture/ Digital Electronics & Computer Organization

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.

Advanced Special Functions

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.

Financial Accounting

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.

AM2PC1:

Real Analysis/ Measure Theory

Learning Outcomes:
Upon completing the course, students will be able to:

- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.
- The course provides the basis for further studies within functional analysis, topology and complex analysis.

AM2PC2:
Advanced Differential Equations

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

AM2PC3:
Theory of Computation

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.

AM2EC1:
Object Oriented Programming with Core Java

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.

AM2EC2:
Comp. Graphics / Multimedia

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.

AM2EM1:
Operations Research-I

Learning Outcomes:
On completion of this course students should be able to:
- Apply linear programming models in different practical situations.
- Optimize the resources different conditions.
- Know the various situation for queuing in service and industrial situations.
- Develop inventory models for various real-life situations.

AM2EM2:
Soft Computing Techniques

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.

AM3PC1:
Topology

Learning Outcomes:
Upon completing the course, students will be able to:
- Work with sets and functions, images and preimages, and you can distinguish between finite, countable, and uncountable sets.
- Define and illustrate the concepts of the separation axioms, connectedness and compactness, and describe different examples distinguishing general, geometric, and algebraic topology.
- Are familiar with the construction of the fundamental group of a topological space and applications to covering spaces and homotopy theory.
- 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.

AM3PC2:
Database Theory

Learning Outcomes :
Upon successful completion of the course, the student will be able to:
- Differentiate database systems from file systems by enumerating the features provided by database systems and describe each in both function and benefit.
- 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.
- 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.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.
- Use a desktop database package to create, populate, maintain, and query a database.
- Demonstrate a rudimentary understanding of programmatic interfaces to a database and be able to use the basic functions of one such interface.

AM3PC3:
Mathematical Statistics

Learning Outcomes:
Upon completing the course, students will be able to:

- To design experiments and surveys for efficiency to perform complex data management and analysis.
- Provide a conclusion to the study including a discussion of limitations of the analysis.
- To apply discrete and continuous probability distributions to various business problems.
- Successfully relate theoretical concepts to a real-world problem.
- Understand how a control chart is used to detect assignable causes and how to apply pattern analysis.
- Apply essential stochastic modelling tools including Markov chains and queuing theory;
- Students will execute statistical analyses with professional software.

AM3SS2:
Life Management Skills

Leaning Outcomes:

- Upon completion of the syllabus, students will be able to:
- Understand how to think in logical way to take right decisions.
- Various traits that separate leader from a non-leader; and develop these into self.
- Understand basics of how emotions control our decisions and use them in a positive way.
- Gain knowledge of how they could groom their personality by improving basic thoughts and skills.

AM3GE1:
OS/Microprocessor

Learning Outcomes:
Upon completing the course, students will be able to:

- Demonstrate understanding of the concept, structure and design of operating system and it's impact on application system design and performance.
- Understand how the operating system manages its resources.
- 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.
- Summarize the full range of considerations in the design of file systems, summarize techniques for achieving synchronization in an operation system,
- 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.

AM3GE2
Integral Transforms

Learning Outcomes:
Upon completing the course, students will be able to:

- Gain a range of techniques employing the Laplace and Fourier Transforms in the solution of ordinary and partial differential equations.
- Apply transform techniques to analyze continuous-time and discrete-time.
- Use the Integral Transforms in Circuit Analysis.

AM3GE3:
Financial Management

Learning Outcomes:
Upon completing the course, students will be able to:

- Describe the financial environment within which organizations must operate.

- Critically evaluate the financial objectives of various types of organizations and the respective requirements of stakeholders.
- Discuss the function of capital markets.
- Explain alternative sources of finance and investment opportunities and their suitability in particular circumstances.
- Assess the factors affecting investment decisions and opportunities presented to an Organization.
- Select and apply techniques in managing working capital.
- Analyze a company's performance and make appropriate recommendations.

AM4PC1:
Complex Analysis

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.

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. AM4PC2:
Analysis of Algorithm

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.

AM4PC3:
Functional Analysis

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.

AM4EC1:
Advanced Java

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

AM4EC2:
Unix/Linux Administration

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.

AM4EC3:
Computer Network/ Internet & Web Technology

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.

AM4EM1:
Operations
Research-II

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.

AM4EM2:
Mathematical Modelling

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.

AM4EM3:
Number Theory/ Cryptography

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.

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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	
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	
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: 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)

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.

ISR1C1
ADVANCED ALGORITHM

Course outcomes:

After the completion of coursestudent will be able to :

perform 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.

ISR1C2
SECURE COMPUTING TECHNIQUES

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.

ISR1C3

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

ISR1G1
ADVANCED DATABASE MANAGEMENT SYSTEMS

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.

ISR1E1
DATA SECURITY

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.

ISR2C1
INFORMATION SECURITY MANAGEMENT

Course outcomes:

After the completion of course student will be able to:

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

ISR2C2
DIGITAL FORENSIC AND SECURITY AUDIT

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.

ISR2C3
SECURE WIRELESS 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
- Develop ability to carry out research in area of security in wireless Networks

ISR2G2
APPLIED CRYPTOGRAPHY

Course outcomes:

After the completion of course student will be able to:

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

ISR2E1
BIOMETRIC SYSTEM AND SECURITY

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

in managing the security of data.

M. E. Computer Engineering (FULL 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
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,CO
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	

M. E. Computer Engineering (FULL TIME) With Specialization in Software Engineering
LIST OF PO,PSO,CO
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:

1. 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.
2. 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.
3. Students can apply basic software quality assurance practices to ensure that software designs, development, and maintenance meet or exceed applicable standards.
4. 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.
5. Students will have theoretical foundations that will help them to analyzing and modelling software requirements.

SER1C1
ADVANCED ALGORITHM

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.

SE1C2
OBJECT ORIENTED ANALYSIS AND DESIGN

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.

SER1C3
SOFTWARE CONSTRUCTION

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.

SER1G1
SOFT COMPUTING

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.

SER1G3

ADVANCED COMPUTER ARCHITECTURE

Learning Outcomes:

Upon Completing the Course, Student will able to:

1.
2. Learn the current trends in high performance computing.
3. Learn the quantitative analysis of computer architectures
4. Learn about Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards
5. Pipeline Hazards, Implementation issues, Overcoming Pipeline hazards
6. Vector architecture, Graphics Processing Units, Detecting and enhancing loop-level parallelism,

STR1E1

DATABASE ENGINEERING

Learning Outcomes:

1.

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.

SER1E2

BIG DATA ANALYTICS

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.

SER2C1

SOFTWARE PROJECT PLANNING AND MANAGEMENT

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

SER2C2

DESIGN PATTERN

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

SER2C3

SOFTWARE TESTING &QA

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

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SER2E1

SPEECH AND LANGUAGE PROCESSING

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.

SER2E3

MACHINE LEARNING

Learning Outcomes:

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

SER2E2

ASPECT ORIENTED SOFTWARE ENGINEERING

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.

SER2G1

DATA MINING AND WAREHOUSING

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.

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	
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	

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**	

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**	

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

1. **Master of Engineering (M.E) in Electronics and Telecommunication Engineering with spl in DIGITAL COMMUNICATION**

a) 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.
b) 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.
c) 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.

DCR1C1
MODERN COMMUNICATION SYSTEM

Course OUTCOMES:

AFTER THE COMPLETION OF THE COURSE STUDENT WILL BE ABLE TO

- Apply the practical 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.

DCR1C2
EMBEDDED SYSTEM USING ARM MICROCONTROLLER

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

DCR1C3
ADVANCED COMPUTER NETWORKING

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 of transport and application layer protocols,
- Will use of cryptography in computer networking.

DCR1G1
ADVANCED SYSTEM DESIGN

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.

DCR1G2
WIRELESS SENSOR NETWORKS

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.

DRC1G3
ADVANCE DIGITAL SIGNAL PROCESSING

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.

DCR1G4
INFORMATION THEORY AND 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.

DCR1E1
SATELLITE COMMUNICATION

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.

DCR1E1
OBJECT ORIENTED PROGRAMMING

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.

DCR1E2
EMBEDDED RTOS

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 practicle 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

DCR1E3
Software Engineering

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

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

ASR1S1
SOFT SKILL-1

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.

DCR2C1
MODELLING AND SIMULATION

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.

DCR2C2
MOBILE COMMUNICATION NETWORKS

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.

DCR2C3
SYSTEM DESIGN USING VERILOG

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.

DCR2G1
BRODBAND ACCESS NETWORKS

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 varients of WLAN (IEEE 802.11 – 802.11 ac).

- Learn about various Frame formats, Modulation and coding.
- Learn the features of Multichip relay WiMAX , Gigabit WiMAX, Wi-Max based Wireless Mesh Networks for practical implementation

DCR2G2

NANODEVICE AND NANO SENSORS

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 approaches 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, Scotty devices,

DCR2G3
ADVANCED ANTENNA SYSTEM

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

DCR2G4
INDUSTRIAL COMMUNICATION

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

DCR2E1
ANALOG AND DIGITAL VLSI CIRCUIT DESIGN

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

- Will learn 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.

DCR2E2
NETWORK SECURITY

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,
- Discrete algorithms.
- Web Security requirements

DCR1E3
MOBILE COMPUTING

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,

DCR2E4
SOFTWARE TESING AND QUALITY ASSURANCE

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 TESING 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

ASR2S2
SOFT SKILL-2

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. Electronics (Specialization in Digital Instrumentation) (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 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_CO

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	
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**	

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:

1. **Master of Engineering (M.E) in Digital Instrumentation.**

a) PSO1: Ability to perform instrumentation and data acquisition in various process industries for better product development and improved quality.
b) PSO2: Ability to apply the concept for accurate and precise measurement of parameters for investigation and analysis in medical domain.
c) 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.
d) 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.
e) 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.
f) 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.

DIR1C1:
Industrial Transducers and smart Sensors

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

DIR1C2:

Embedded System using ARM Microcontroller

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 of the application.

DIR1C3:

Modern Control Systems

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 products 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.

DIR1G1:
Advance System Design

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.

DIR1G2:

Wireless Sensor Networks

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.

DIR1G3:

Advanced Communication Networks

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

DIR1G4:

Medical Instrumentation

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.

DIR1E1:

Fuzzy Logic and Neural Network

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.

DIR1E2:
Object Oriented Programming

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.

DIR1E3:

Nano devices& Nano sensors

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.

DIR1E4:
AdvanceDigitalSignal Processing

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.

DIR2C1:

Digital Image Processing

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.

DIR2C2:

Process Instrumentation and Industrial Control

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

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

DIR2C3:

System Design using Verilog

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.

DIR2G1:

Software Engineering

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

DIR2G2:

EmbeddedRealTime Operating Systems (RTOS)

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.

DIR2G3:

Modelling and Simulation

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.

DIR2G4:

Industrial Communication

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

DIR2E1:

Analog and Digital VLSI Circuit Design

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.

DIR2E2:

Analytical Instrumentation

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.

DIR2E3:

Optical and Laser Instrumentation

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.

DIR2E4:

Advanced Industrial Drives and Control

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 Mechanical Engineering (Design & Thermal) (Full Time)
LIST OF PO,PSO,CO for CBCS

SEM I				
S.NO	***Sub Code***	***Sub Name***	***Number of Credit***	***Sub Type***
1.	DTR1C1	Tribology	3-1-1 =5	PC1
2.	DTR1C2	Design of Internal Combustion Engine Systems	3-1-1 =5	PC2
3.	DTR1C3	Advanced Machine Design	3-1-1 =5	PC3
4.		***Generic Elective I***	3-1-0 =4	GE1
5.		***Elective I***	3-1-1 =5	PE1
6.	ASR1S1	Soft Skills -1	2-0-0 =2	
7.	DTR1W1	Seminar/ Res. Tool/Work Shop-1	0-2-0=2	
8.	DTR1V1	Comprehensive Viva I	0-0-4=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.		***Generic Elective II***	3-1-0 =4	GE2
5.		***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		
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**	
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.

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.

DTR1C1
TRIBOLOGY

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.

DTR1C2

DESIGN OF INTERNAL COMBUSTION ENGINE SYSTEM

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

DTR1C3/DTP2C3
ADVANCE MACHINE DESIGN

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.

DTR1E1
ADVANCED MECHANICS OF SOLIDS

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

DTR1E2
FATIGUE CREEPAND FRACTURE

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.

DTR1E3
MECHANISM AND ROBOT KINEMATICS

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

DTR1E4
THERMAL SYSTEM SIMULATION DESIGN

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

DTR1G1
ADVANCED THERMODYANAMICS

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

DTR1G2
NON CONVENTIONAL ENERGY SYSTEM

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

DTR1G3
MANAGEMENT INFORMATION SYSTEM

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

DTR1G4
FINITE ELEMENT ANALYSIS

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

DTR2C1

MACHINARY FAULT DIAGNOSIS & SIGNAL PROCESSING

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

DTR2C2
ADVANCED REFRIGERATION AND AIR CONDITIONING

COURSE OUTCOMES:
AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- Understand Cascade Refrigeration System; Liquefaction of Gases
- Understand Vapor Absorption Systems: Ammonia-Water, Three fluid, Water-Lithium bromide
- Understand Decentralized Cooling and Heating; Individual systems; Evaporative; Desiccant; Thermal storage;
- Understand Control Loop and Control Methods; Control Modes

DTR2C3
COMPUTER AIDED MODELING AND SIMULATION

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.

DTR2E1
MACHINE VIBRATION AND ANALYSIS

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.

DTR2E2
EXPERIMENTAL STRESS ANALYSIS

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.

DTR2E3
APPLIED ELASTICITY AND PLASTICITY

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.

DTR2E4
AUTOMATIVE SYSTEM ANALYSIS & DESIGN

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.

DTR2G1
ADVANCED HEAT TRANSFER

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

DTR2G2

RAPID PROTOTYPING

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

DTR2G3

COGENRATION AND WASTE HEAT RECOVERY

COURSE OUTCOMES:

AFTER THE COMPLETION OF COURSE STUDENT WILL BE ABLE TO:

- 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 Mechanical Engineering (Industrial Engineering & Management)
(Full Time)
LIST OF PO_PSO_CO

SEM I				
S.NO	***Sub Code***	***Sub Name***	***Number of Credit***	***Sub Type***
1.	IMR1C1	Productivity & Technology Management	3-1-1 =5	PC1
2.	IMR1C2	Quantitative Techniques for Management	3-1-1 =5	PC2
3.	IMR1C3	Production & Operations Management	3-1-1 =5	PC3
4.	IMR1Gx	***Generic Elective I***	3-1-0 =4	GE1
5.	IMR1Ex	***Elective I***	3-1-1 =5	PE1
6.	ASR1S1	Soft Skills -1	2-0-0 =2	
7.	IMR1W1	Seminar/ Res. Tool/Work Shop-1	0-2-0=2	
8.	IMR1V1	Comprehensive Viva I	0-0-4=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 =5	PC4
2.	IMR2C2	Materials Management	3-1-1 =5	PC5
3.	IMR2C3	Supply Chain Management	3-1-1 =5	PC6
4.	IMR2Gx	***Generic Elective II***	3-1-0 =4	GE2
5.	IMR2Ex	***Elective II***	3-1-1 =5	PE2
6.	ASR2S2	Soft Skills -2	2-0-0 =2	
7.	IMR2W2	Seminar/ Res. Tool/Work Shop-2	0-2-0=2	
8.	IMR2V2	Comprehensive Viva II	0-0-4=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		
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**	

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.

IMR1C1
PRODUCTIVITY AND TECHNOLOGY MANAGEMENT

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.

IMR1C2
QUANTATIE TECHNIQUES FOR MANAGEMENT.

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.

IMR1C3
PRODUCTION AND OPERATION MANAGEMENT

Course outcomes

After completing the course the student will 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.

IMR1G1
PRINCIPALS AND PRACTICALS OF MANAGEMENT

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.

IMR1E1
STATISTICAL QUALITY CONTROL AND TQM

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.

IMR1G3
E-BUISNESS & commerce

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,

IMR1E3
BUISNESS PROCESS RE-ENGINEERING

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.

IMR1E2
STRATEGIC MANAGEMENT

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.

IMR2C1
FINANCIAL MANAGEMENT

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.

IMR2C2
MATERIALS MANAGEMENT

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 –

IMR2C3
SUPPLY CHAIN MANAGEMENT

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

IMR2G1
PROJECT MANAGEMENT

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:

IMR2G2
ENTERPRISE RESOURCE PLANNING

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, Oracle Corporation.
- Learn about Internet, Future Directions in ERP.

IMR2E1
MARKETING MANAGEMENT

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 organization 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,.

IMR2E2
PRODUCT DESIGN AND MANUFACTURING

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.

IMR2E3
CUSTOMER RELATIONSHIP MANAGEMENT

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.

IMR2E4
INDRUSTRIAL MARKETING

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