

**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:

**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.

**2. 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.

**3. 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.

#### **4. 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.

#### **5. 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.

#### **6. Bachelor of Engineering (B.E) in Civil Engineering**

- a) PSO1: The graduates will have the ability to plan, analyse, design, execute and maintain cost effective civil engineering structures without over exploitation of natural resources.
- b) PSO2: The graduates of civil engineering program will have the ability to take up employment, entrepreneurship, research and development for sustainable civil society.

**Program outcomes (POs)** designed for M.Sc. Applied Mathematics (with specialization in Computing and Informatics) of IET DAVV are

PO1: Create more interest in the subject and motivated towards self-learning.

PO2: Strengthen the logical reasoning, which is the main ingredient to understand subjective concepts and to inculcate the habit of making observations and experimentation and arrive at

PO3: Acquire the communication skill to take up a career in either Teaching their subject at various levels including schools, colleges, universities, etc or as a researcher and analyst or in professional courses.

PO4: Communicate effectively both orally and in writing, work effectively in teams, exhibit ethical and professional behaviour.

PO5: Demonstrate knowledge and understanding of the underlying principles and apply these to one's own work, as a member and leader in a team, manage projects in multidisciplinary environments.

PO6: Propose new questions and suggest possible software packages and/or computer programming to find solutions to these questions.

PO7: Identify, formulate, research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematical, biological, physical and chemical sciences, programming and so on.

**Program Specific Outcomes (PSOs)** for M.Sc. Applied Mathematics (with specialization in Computing and Informatics)

PSO1: Develop core skills in Applied Mathematics and methods that find use in science, engineering, business, computer science, and industry. And allows to specialise in industrial modelling or numerical analysis, in preparation for study towards a PhD or a career using Mathematics within industry.

PSO2: Be enriched with analytical skills, problem solving and communication skills as well as independently design, develop and implement computer applications.

PSO3: Enhance career opportunities and bring themselves at par with professional courses.

## **Example Course Outcomes/ Learning Outcomes**

### **BE I year**

#### **AMR1C1: Applied Mathematics-I**

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**

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.

#### **APR2C2: Applied Physics**

Upon completing the course, students will be able to:

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

## **BE II year: Computer Engineering**

### **CER3C2 OBJECT ORIENTED PROGRAMMING**

Upon completing the course, students will be able to:

- Analyze and code the solution to problem using object oriented paradigm.
- Understand Java language constructs.
- Apply object model for software development

## **BE III year: Mechanical Engineering**

### **MER5C1 DYNAMICS OF MACHINE**

- 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

## **BE IV year: Civil Engineering**

### **VLR7C1: Transportation Engineering - II**

- 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 analyse

**DEVI AHILYA VISHWAVIDYALAYA, INDORE**



**FACULTY OF ENGINEERING**

**LIST OF PO, PSO, CO (CBCS)**

**BE Programme  
(CIVIL ENGINEERING)**

**Effective from July 2015**

**INSTITUTE OF ENGINEERING & TECHNOLOGY**

([www.iet.dauniv.ac.in](http://www.iet.dauniv.ac.in))

## Program outcomes

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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.

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

**SSR1S1:  
Technical English**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Apply various technical terms and terminologies practically
- The course aims at developing the fundamentals of Technical English and mastery in the professional writing like Business letters, Business correspondence, designing Business Memorandum, Resume and E-mail writing.
- Will be able to write formal and informal reports in work place.
- Will have complete knowledge of comprehending different passages and Precis writing.
- Apply various grammatical skills practically.

**AMR2C1:  
Applied Mathematics-II**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Express a linear map between finite-dimensional vector spaces with a matrix, calculate the electrical properties of a circuit, with voltage, amperage, resistance, etc. with matrix arithmetic, use them in 3D geometry (e.g. computer graphics), can try to improve linear solvers efficiency. Matrices can also represent quadratic forms (for example, in analysis to study hessian matrices, which help us to study the behaviour of critical points) and also computers run Markov simulations based on stochastic matrices in order to model events ranging from gambling through weather forecasting to quantum mechanics.
- Use differential equations to model natural phenomena, engineering systems and many other situations like exponential growth and decay, the population growth of species or the change in investment return over time, describing the movement of electricity, in modelling chemical reactions, in finding optimum investment strategies, describing the motion of waves, pendulums or chaotic systems.
- Handle probability distributions, to indicate the likelihood of an event or outcome, which are used for making forecasts and risk assessments. Pdf's are quite important and widely used in insurance, engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.
- Use fitted curves as an aid for data visualization, to infer values of a function where no data are available, and to summarize the relationships among two or more variables.
- Apply Fuzzy sets and logic to reason like a human in terms of linguistic variables, design Traffic monitoring systems, AC and heating ventilation, Gene Expression data analysis, Facial pattern recognition, Weather forecasting systems and many more.

**APR2C2:  
Applied Physics**

**Learning Outcomes:**

- The student will demonstrate the ability to use concepts of Modern physics to their engineering applications.

- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their application to obtain quantitative solutions of problems in physics.

**MER2C3:  
Engineering Drawing**

**Learning Outcomes:**

- Upon Completing the Course, Student will be 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**

**Learning Outcomes:**

Upon completing the course, students will be able to :

- To solve circuit problems based on KVL, KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .
- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing a electrical machine at initial level.
- After this course, students were able to understand different properties, characteristics and functioning of different parts of transformer and different rotating electrical machines at basic level.

**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

- Inspire 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 where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work 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 be able to:

- Learn behavior of different materials 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 STRUCTURAL 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 Bernoulli principle and compute pressure drop in flow systems of different configurations (Unit II)
- Students will compute power requirement in fixed bed system and determine minimum fluidization velocity in fluidized bed (Unit III)
- Students will be able to describe function of flow metering devices and apply Bernoulli equation to determine the performance of flow-metering devices
- Students will be able to determine and analyze the performance aspects of fluid machinery specifically for centrifugal pump and reciprocating pump

### **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 Bernoulli principle and compute pressure drop in flow systems of different configurations
- Students will compute power requirement in fixed bed system and determine minimum fluidization velocity in fluidized bed
- Students will be able to describe function of flow metering devices and apply Bernoulli equation to determine the performance of flow-metering devices
- Students will be able to determine and analyze the performance aspects of fluid machinery specifically for centrifugal pump and reciprocating pump



**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

### **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

the field of water resource

## **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 ENGINEERING**

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- 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 STRUCTURAL 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

**VLR8E1**  
**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.

**VLR8E2**  
**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.

**VLR8E3**  
**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.

**VLR8E4**  
**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

**VLR8E5**  
**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

**VLR8E6**  
**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 VISHWA VIDYALAYA, 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](http://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.

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**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:

**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 of 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 Modern 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 better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing a electrical machine at initial level.
- After this course, students were able to understand different properties, characteristics and functioning of different parts of transformer and different rotating electrical machines at basic level.

## **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 where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.
- Use optimization techniques to provide a mathematical model to represent complex functional relationships.

**CER3C2**  
**OBJECT ORIENTED PROGRAMMING**

**Course Outcomes:**

Upon completing the course, student will be able to:

- Analyze and code the solution to a problem using an object-oriented paradigm.
- Understand Java language constructs.
- Apply an object model for software development.

**CER3C3**  
**DATA STRUCTURES**

**Course Outcomes:**

Upon completing the course, students will be able to:

- Learn the basic types for data structures, implementation and application.
- Know the strengths and weaknesses of different data structures.
- Use the appropriate data structure in the context of solving a given problem.
- Develop programming skills which are required to solve a given problem.

**CER3G1**  
**COMPUTER ORGANIZATION ARCHITECTURE**

**Course Outcomes:**

Upon completing the course, students will be able to:

- Acquire advanced knowledge and understanding of computing.
- Use skills in computer design.
- Apply acquired knowledge to improve the 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 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 be 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 DATABASE 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 perceptives of cloud architecture and model
- Apply different cloud programming models as per need.
- Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications

**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 Prolog Programming 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 performance 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 effective 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(CBCS)**

**BE Programme**  
**(Electronics & Telecommunication)**  
Effective from July 2015

**INSTITUTE OF ENGINEERING & TECHNOLOGY**  
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**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 of 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 Modern physics to their engineering applications.
- The course aims at developing the fundamentals of wave optics, crystal structure, structure of atoms and their application to obtain quantitative solutions of problems in physics.

**MER2C3:  
Engineering Drawing**

**COURSE OUTCOMES:**

- Upon Completing the Course, Student will be 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 :

- To solve circuit problems based on KVL, KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .
- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing an 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 where analytical methods seem 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 MEASUREMENT**

##### **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 COMMUNICATION**

**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

- (1) Various processes and their types involved in mobile communication system.
- (2) 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**  
**ENTREPRENEURSHIP AND IPR DEVELOPMENT**

**COURSE OUTCOMES:**

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

1. Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
2. Understand entrepreneurial process by way of studying different cases and performing class activities.

## **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 layout 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 WAVE PROPAGATION**

**COURSE OUTCOMES:**

Upon completing the course, student will be 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.

#### **ETR8C1**

### **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

**ETR8C2**  
**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.

**ETR8C4**  
**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)**  
Electronics and Instrumentation

**BE Programme**  
(Electronics and Instrumentation)  
Effective from July 2015

**INSTITUTE OF ENGINEERING & TECHNOLOGY**

([www.iet.dauniv.ac.in](http://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

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

**SSR1S1:  
Technical English**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Apply various technical terms and terminologies practically
- The course aims at developing the fundamentals of Technical English and mastery in the professional writing like Business letters, Business correspondence .designing Business

Memorandum, Resume and E-mail writing.

- Will be able to write formal and informal reports in work place.
- Will have complete knowledge of comprehending different passages and Precis writing.
- Apply various grammatical skills practically.

### **AMR2C1: Applied Mathematics-II**

#### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Express a linear map between finite-dimensional vector spaces with a matrix, calculate the electrical properties of a circuit, with voltage, amperage, resistance, etc. with matrix arithmetic, use them in 3D geometry (e.g. computer graphics), can try to improve linear solvers efficiency. Matrices can also represent quadratic forms (for example, in analysis to study hessian matrices, which help us to study the behaviour of critical points) and also computers run Markov simulations based on stochastic matrices in order to model events ranging from gambling through weather forecasting to quantum mechanics.
- Use differential equations to model natural phenomena, engineering systems and many other situations like exponential growth and decay, the population growth of species or the change in investment return over time, describing the movement of electricity, in modelling chemical reactions, in finding optimum investment strategies, describing the motion of waves, pendulums or chaotic systems.
- Handle probability distributions, to indicate the likelihood of an event or outcome, which are used for making forecasts and risk assessments. Pdf's are quite important and widely used in insurance, engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.
- Use fitted curves as an aid for data visualization, to infer values of a function where no data are available, and to summarize the relationships among two or more variables.
- Apply Fuzzy sets and logic to reason like a human in terms of linguistic variables, design Traffic monitoring systems, AC and heating ventilation, Gene Expression data analysis, Facial pattern recognition, Weather forecasting systems and many more.

### **APR2C2: Applied Physics**

#### **Learning Outcomes:**

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

### **MER2C3: Engineering Drawing**

#### **Learning Outcomes:**

- Upon Completing the Course, Student will able to:
- Understand the importance of BIS and ISO Standards in Engineering Drafting.
- Graphically construct and understand the importance of mathematical curves in engineering applications.

- Visualize geometrical solids in 3D space through exercises in Orthographic Projections.
- Interpret Orthographic, Isometric and Perspective views of objects.
- Develop the surfaces of geometrical solids.

**EIR2C4:  
Electrical Engineering**

**Learning Outcomes:**

Upon completing the course, students will be able :

- To solve circuit problems based on KVL, KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .
- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing a electrical machine at initial level.
- After this course, students were able to understand different properties, characteristics and functioning of different parts of transformer and different rotating electrical machines at basic level.

**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.

**AER3C1**  
**Applied Mathematics-III**

**Learning Outcomes:**

Upon completing the course, students will be able to:

1. Apply the concept of complex analysis, Fourier analysis and stochastic process in various subjects of engineering like electromagnetic and electrostatic field theory, control theory, signal processing, power transmission and so on.
2. Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.

**EIR3C2**  
**DIGITAL ELECTRONIC**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Understand driving capacity of a gate and voltage-current parameters.
- Implement digital circuit for arithmetic operations.
- Implement digital circuit with optimized hardware.
- Design and Analyse any combinational digital circuit
- Design and Analyse any sequential circuit
- Using analog to digital and digital to analog IC's for data conversion.
- Design circuit to generate clock and pulses of desired frequency.

**EIR3C3**  
**DATA STRUCTURE**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Learn the basic types for data structure, implementation and application.
- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem.
- Develop programming skills which require to solve given problem.

**EIR3C4**  
**NETWORK ANALYSIS**

**Learning Outcomes:**

Upon Completing the Course, Student will be 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**

**Learning 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

**Learning Outcomes:** Student can identify the active and passive electronic components. Student gets hands-on assembling, testing, assembling, dismantling, fabrication and repairing systems by making use of the various tools and instruments available in the Electronics Workshop.

**SIR3S3**  
**EFFECTIVE COMMUNICATION SKILL**

**Learning Outcomes:**

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

**EIR4C1**  
**COMPUTER ORGANIZATION AND ARCHITECTURE**

**Learning Outcomes:**

On completion of the course, student will be able to :

- Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
- Analyze the performance of commercially available computers.
- To develop logic for assembly language programming

**EIR4C2**  
**ELECTRICAL AND ELECTRONIC MEASUREMENT**

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

- To use the techniques and skills for electrical projects.
- Design a system, component or process to meet desired needs in electrical engineering.
- Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy
- Ability to balance Bridges to find unknown values.
- Ability to measure frequency, phase with Oscilloscope.

- Ability to use Digital voltmeters

### **EIR4C3**

#### **ANALOG ELECTRONICS**

**Learning Outcomes:** After studying this course, students will be able to:

- Acquire knowledge of and Working principles, characteristics and basic applications of BJT and FET.
- Single stage, cascaded and feedback amplifier configurations and Frequency response characteristics of BJT and FET.
- Analyze the performance of FET amplifier in CS configuration and Power Amplifiers and Oscillator circuits.
- Interpretation of performance characteristics of transistors amplifiers, frequency Response and Oscillators.
- Apply the knowledge gained in the design of transistorized circuits, amplifiers and Oscillators.

### **EIR4C4**

#### **SENSOR AND TRANSDUCER**

**Learning Outcomes:**

After successful completion of this course, students should

1. Understand the fundamental principles of various types of sensors including thermal, mechanical, electrical, electromechanical and optical sensors.
2. Understand their general characteristics, terminologies, sensing and transduction principles;
3. Be familiar with criteria for sensors and transducers selection and choose appropriate measurement methods for engineering tasks and scientific researches.

### **EIR4G2**

#### **SIGNAL&SYSTEMS**

**Learning Outcomes:**

On Completion of this course the students will be able to:

- The focus of this course is to familiarize the students with the concept of Fourier transform & Fourier series.
- Analyze the spectral characteristics of signals using Fourier analysis.
- Classify systems based on their properties and determine the response of LTI
- Identify system properties based on impulse response and Fourier analysis.
- Apply transform techniques to analyze continuous-time and discrete-time

**EIR4L2  
ELECTRONIC WORKSHOP II**

**Learning Outcomes:**

Upon completing the course, students will be able to

- Design, test and implement any Analog or Digital circuit by making use of the various tools and instruments available in the Electronics Workshop.

**SER4S4  
ENGINEERING ECONOMICS**

**Learning Outcomes:**

Upon completing the course, students will be able to:

Understand major principles of economic analysis for decision making among alternative courses of action in engineering.

Apply economic principles to prices and quantities in competitive supply and demand for goods and for money.

Solve economic problems involving comparison and selection of alternatives by using analytical techniques including benefit-cost ratio and breakeven analysis.

**EIR5C1  
OBJECT ORIENTED PROGRAMMING**

**Learning Outcomes:**

Upon completing the course, Student would be able to:

- Understand the basic concepts of Java programming
- familiarize with the declaration of classes, arrays, operations with arrays, process of inheritance.
- Learn the implementation of interfaces, importing packages, handling exceptions and creating applets.
- learn how to write, compile and get results of simple application programs in Java

**EIR5C2  
ANALOG & DIGITAL COMMUNICATION**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Understand basics of signals, frequency domain analysis & its importance.
- Understand the working of transmitter and receiver in analog & digital communication system.
- Understand about the digital data transmission using line coding.
- Understand how to detect and correct the errors introduced during the transmission.

### **EIR5C3**

#### **Power Electronics**

##### **Learning 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:

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

### **EIR6C1**

## **VLSI Design**

### **Course Outcomes**

Upon completing the course, Student would be able to:

1. Design building blocks of digital IC using Gate level Modeling.
2. Design building blocks of digital IC using Dataflow Modeling.
3. Design stimulus blocks to test the functionality of the designs.

## **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**

- 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:

1. Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
2. Understand entrepreneurial process by way of studying different cases and performing class activities.

**EIR6G4**  
**COMPUTER NETWORKS**

**Learning Outcome:**

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

**EIR7C1**  
**PROJECT PHASE -I**

**Learning Outcomes:**

Upon completing the course, Student would be able to:

- Work in a team
- Develop small working projects through designing, analysis and testing of model
- Able to give presentation on the project developed

**EIR7C2**  
**OPERATING SYSTEM**

**Learning Outcomes:**

Upon Completing the Course, Student will able to learn:

- Understands the different services provided by Operating System at different level.
- They learn real life applications of Operating System in every field.
- Understands the use of different process scheduling algorithm and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

**EIR7C3**  
**INTELLIGENT INSTRUMENTATION SYSTEM**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

1. Understand the concept of intelligent instrumentation
2. Identify the optimized protocol selection according to the application area
3. Design complete automatic process control system
4. Analyze the DCS and SCADA systems In industry

**EIR7C4**  
**Process Instrumentation & Control**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

1. Understand the basic principles, terminologies, mathematical analysis and block diagrams related to the industrial processes.
2. Comprehend the use of various components, instrumentation and strategies for controlling and fine tuning the process.
3. Develop skills for the efficient design of process control loops for process engineering plants.

**EIR7E1**  
**CIRCUIT DESIGN USING HDL**

**Learning Outcomes:**

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

- Able to design digital systems through HDL language
- Simulation, synthesis and implementation of HDL code
- Implementation of code on FPGA/CPLD

**EIR7E3**  
**SPEECH AND IMAGE PROCESSING**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

- learn the theory behind fundamental processing tasks including image/video enhancement, recovery, and compression.
- learn how to perform these key processing tasks in practice using state-of-the-art techniques and tools like optimization toolboxes to statistical techniques.

**EIR8C1**  
**PROJECT PHASE-II**

**Learning Outcomes:**

Upon completing the course, Student would be able to:

- Work in a team
- Develop small working projects through designing, analysis and testing of model
- Able to give presentation on the project developed

## **EIR8C2 EMBEDDED SYSTEM**

### **Learning Outcome:**

After learning the course the students should be able to

- Understand the fundamentals of embedded systems
- Understanding of C and basics of C Understand the OOP concepts of classes, objects, methods,
- constructors, destructors in C++
- Understand the microcontroller architecture (PIC)
- Understand and able to write the assemble language program.
- Understand and able to write the I/O and timers/counter programming

## **EIR8C3 OPTICAL INSTRUMENTATION**

### **Learning Outcomes:**

- Upon completing the course, students will be well versed with the fundamental concepts of optical instrumentation, and will be able to contribute to the current and upcoming advances in the technology.

## **EIR8C4 INTERNET OF THINGS**

### **Learning Outcomes:**

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

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

## **EIR8E1 NETWORK SECURITY**

### **Learning Outcomes:**

At the end of this course, students will be able to:

- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures.
- Identify the security issues in the network and resolve it.



- Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations.
- Formulate research problems in the computer security field.

**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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**DEVI AHILYA VISHWAVIDYALAYA, INDORE**



**FACULTY OF ENGINEERING**

**LIST OF PO\_PSO\_CO (CBCS)**

**BE Programme  
(INFORMATION TECHNOLOGY)  
Effective from July 2015**

**INSTITUTE OF ENGINEERING & TECHNOLOGY**  
([www.iet.dauniv.ac.in](http://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

#### 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**

##### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Apply various technical terms and terminologies practically
- The course aims at developing the fundamentals of Technical English and mastery in the professional writing like Business letters, Business correspondence .designing Business Memorandum, Resume and E-mail writing.
- Will be able to write formal and informal reports in work place.
- Will have complete knowledge of comprehending different passages and Precis writing.
- Apply various grammatical skills practically.

### **AMR2C1:**

#### **Applied Mathematics-II**

##### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Express a linear map between finite-dimensional vector spaces with a matrix, calculate the electrical properties of a circuit, with voltage, amperage, resistance, etc. with matrix arithmetic, use them in 3D geometry (e.g. computer graphics), can try to improve linear solvers efficiency. Matrices can also represent quadratic forms (for example, in analysis to study hessian matrices, which help us to study the behaviour of critical points) and also computers run Markov simulations based on stochastic matrices in order to model events ranging from gambling through weather forecasting to quantum mechanics.

- Use differential equations to model natural phenomena, engineering systems and many other situations like exponential growth and decay, the population growth of species or the change in investment return over time, describing the movement of electricity, in modelling chemical reactions, in finding optimum investment strategies, describing the motion of waves, pendulums or chaotic systems.
- Handle probability distributions, to indicate the likelihood of an event or outcome, which are used for making forecasts and risk assessments. Pdf's are quite important and widely used in insurance, engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.
- Use fitted curves as an aid for data visualization, to infer values of a function where no data are available, and to summarize the relationships among two or more variables.
- Apply Fuzzy sets and logic to reason like a human in terms of linguistic variables, design Traffic monitoring systems, AC and heating ventilation, Gene Expression data analysis, Facial pattern recognition, Weather forecasting systems and many more.

**APR2C2:  
Applied Physics**

**Learning Outcomes:**

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

**MER2C3:  
Engineering Drawing**

**Learning Outcomes:**

- Upon Completing the Course, Student will be 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**

**Learning Outcomes:**

Upon completing the course, students will be able to :

- To solve circuit problems based on KVL, KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .
- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing an 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++**

**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.

**AIR3C1  
DISCRETE MATHEMATICS****Learning Outcomes:**

Upon completing the course, students will be able to:

- Learn a particular set of mathematical facts and know how to apply them.
- Think logically and mathematically.
- Use and analyze recursive definitions.
- How to count some different types of discrete structures.
- Techniques for constructing mathematical proofs and to reason about the efficiency of an algorithm.

**ITR3C2  
OBJECT ORIENTED PROGRAMMING****Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Analyze and code the solution to problem using object oriented paradigm.
- Understand Java language constructs.

- Apply object model for software development

**ITR3C3**  
**DATA STRUCTURE**

**Learning Outcomes :**

Upon Completing the Course, Student will able to:

- Learn the basic types for data structure, implementation and application.
- Know the strength and weakness of different data structures.
- Use the appropriate data structure in context of solution of given problem..
- Develop programming skills which require to solve given problem.

**ITR3C4**  
**DIGITAL ELECTRONICS**

**Learning Outcomes :**

Upon completing the course, students will be able to:

- Understand how to represent data in digital form.
- Understand driving capacity of a gate and voltage-current parameters.
- Design and Analyse any combinational and sequential digital circuit Using analog to digital and digital to analog IC's for data conversion.
- Understand basics of microprocessors

**ITR3G1**  
**COMPUTER ORGANISATION & ARCHITECTURE**

**Learning 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**

**Learning Outcomes:**

Upon Completing the Course, Student will able to: learn the knowledge of hardware parts and Assemble a computer System and Installation & Uninstallation of Software.

**SIR3S3**  
**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.

### **AIR4C1 NUMERICAL AND OPTIMIZATION TECHNIQUES**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.
- Use optimization techniques to provide a mathematical model to represent complex functional relationships.

### **ITR4C2 OPERATING SYSTEM**

**Learning Outcomes:**

- Understands the different services provided by Operating System at different levels.
- They learn real-life applications of Operating System in every field.
- Understands the use of different process scheduling algorithms and synchronization techniques to avoid deadlock.
- They will learn different memory management techniques like paging, segmentation and demand paging etc.

### **ITR4C3 Software engineering**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- A clear understanding of Software Engineering concepts.
- Knowledge gained of Analysis and System Design concepts.
- Ability to manage change during development.
- Basic idea of the SOA and AOP concepts

### **ITR4C4 DATABASE MANAGEMENT SYSTEM**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Understand the fundamentals of relational database systems 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**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Understand frequency domain analysis and its importance.
- Understand about the digital data transmission using line coding.
- Understand the working of transmitter and receiver in digital communication system.
- Understand how to detect and correct the errors introduced during the transmission.
- Understand basics of secured communication using spread spectrum techniques.

**ITR4L2**  
**SMART SYSTEM**

**Learning Outcomes:**

Upon completing the course, students will be:

- Familiar with Arduino environment and its applications.
- Able to understand Arduino programming with C++.
- Able to Design Smart systems applications.
- Learn and understand about any new IDE, compiler, and MCU chip in Arduino compatible boards or similar types.

**SIR4S4**  
**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.

**ITR5C1**  
**THEORY OF COMPUTATION**

**Learning Outcomes:**

After completing the course, the student will be able to:

- Model, compare and analyse different computational models.
- Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.

- Identify limitations of some computational models and possible methods of proving them.
- Have an overview of how the theoretical study in this course is applicable to 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**

##### **Learning Outcomes:**

After successfully completing this course you will be able to:

- Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
- Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language

### **ITR5C3**

#### **COMPUTER NETWORK**

##### **Learning Outcomes:**

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

### **ITR5G3**

#### **APPLIED STATISTICS**

##### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Use statistics for a specialist study of applications areas like developing speech recognition software, quality management, software engineering, storage and retrieval processes and software and hardware engineering and manufacturing.

## **ITR5E1 WEB TECHNOLOGY**

### **Learning Outcomes:**

After completion of the course students will be able to -

- Describe the concepts of WWW including browser and HTTP protocol.
- Develop the modern web pages using the HTML5 and CSS3 features with different layouts as per the need of applications.
- Use JavaScript to develop the dynamic web pages and validate data entered by users through forms
- Use Servlets to generate the web pages dynamically using the database connectivity.
- Develop modern Web Applications using the client and server side technologies and the web design fundamentals

## **ITR5L3 SCRIPTING LANGUAGE PROGRAMMING**

### **Learning Outcomes:**

After completion of the course students will be able to –

- Apply scripting language programming skills for modern computing requirements.

## **SIR5S5 PRINCIPLES OF MANAGEMENT**

### **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.

## **ITR5E2 UNIX AND SHELL PROGRAMMING**

### **Learning Outcomes:**

Upon completion of the subject, students will be able to:

- Identify and use UNIX utilities to create and manage simple file processing operations,
- Organize directory structures with appropriate security.
- Effectively use the UNIX system.
- Monitor system performance and learn the shell scripts.
- Use the shell scripts in designing a programs for engineering problems.

## **ITR5E4 DISTRIBUTED OPERATING SYSTEM**

### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Distinguish the theoretical and conceptual foundations of distributed computing. Recognize the feasibility and the impossibilities in managing resources.
- Identify the core concepts of distributed systems and also identify the problems 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**

### **Learning Outcomes:**

Upon completing the course, students will:

- Be familiar with wireless communication methodologies
- Learn wireless communication protocols and different standards
- Be able to apply these concepts in Wireless Network planning, design and administration to support mobility.

**ITR6C2**  
**DESIGN AND ANALYSIS OF ALGORITHM**

**Learning Outcomes:**

Students who have completed this course should be able to:

- Apply design principles and concepts to algorithm design
- Have the mathematical foundation in analysis of algorithms
- Understand different algorithmic design strategies
- Analyze the efficiency of algorithms using time and space complexity theory

**ITR6C3**  
**NETWORK & INFORMATION SECURITY**

**Learning Outcomes:**

After completing this course the student must demonstrate the knowledge and ability to:

- Acquire a practical overview of the issues involved in the field of information security.
- Demonstrate a basic understanding of the practice of IS, especially in evaluation of information security risks across diverse settings including the Internet and WWW based commerce systems, high bandwidth digital communications and funds transfer services.
- The learning outcome is students shall be able to understand what are the common threats faced today, what are the foundational theory behind information security, what are the basic principles and techniques when designing a secure system, how to think adversarial, how today's attacks and defences work in practice, how to assess threats for their significance, and how to gauge the protections and limitations provided by today's technology.
- Familiarity with the basic protocols of Information Security, and how they can be used to assist in network security design and implementation.

**ITR6E1**  
**SOFTWARE TESTING & QUALITY ASSURENCE**

**Learning 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**

### **Learning Outcomes:**

Upon completing the course, students will be:

- Acquire advance knowledge and understanding of Compiler. Use skills in Compiler Design.
- Apply acquired knowledge to improve performance of a Compiler.
- In addition to development in technology computer architectures offers a variety of resources of which students will be able to innovate in the Compiler Design.

## **ITR6L4 MOBILE TECHNOLOGY LAB**

### **Learning Outcomes:**

Upon completing the course, students will be:

- Familiar with Android architecture, operating system and its SDK. Able to develop mobile applications using Android technology.

## **SIR6S6 ENTERPRENURSHIP DEVELOPMENT&IPR**

### **Learning Outcomes:**

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

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

## **ITR7C1 CLOUD COMPUTING**

### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Understand about cloud architecture and deployment models Learned about broad perceptive of cloud services
- Learned about database management in cloud computing
- To make them understand about resource management in cloud computing
- To make them familiar with the various cloud security issues and research trends in cloud

**ITR7C2  
COMPUTER GRAPHICS**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Able to learn the basics of 2D/3D design and its implementations.
- Able to write programs for latest Input/ Output Devices and Human computer Interaction.
- Students will be aware about the latest technology used in display technology.

**ITR7E1  
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, 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**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Familiar with Artificial Intelligence, its foundation and principles. Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications. Learn Prolog Programming to program intelligent systems.

**ITR8E1  
DATA WARE HOUSING AND MINING**

**Learning Outcomes:**

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

**ITR8E2  
HUMAN COMPUTER INTERACTION**

**Learning 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



**ITR8E3  
MACHINE LEARNING**

**Learning 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**

**Learning Outcomes:**

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







**DEVI AHILYA VISHWAVIDYALAYA, INDORE**



**FACULTY OF ENGINEERING**

**List of PO, PSO, CO (CBCS)**

**BE Programme  
(MECHANICAL ENGINEERING)  
Effective from July 2015**

**INSTITUTE OF ENGINEERING & TECHNOLOGY**  
([www.iet.dauniv.ac.in](http://www.iet.dauniv.ac.in))

## Program outcomes

**Program outcomes** (POs) designed for Engineering Graduates of IET DAVV are adopted from the POs as specified by NBA. They are briefly summarized as:

**PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Programme Specific Outcomes

### 1. Bachelor of Engineering (B.E) in Mechanical Engineering

- a) PSO1: Excellence in Thermal, Design & Industrial & Production Engineering by acquiring knowledge in concept of Thermal Systems, Selection of Materials, Stress Analysis, Layouts and Product Design.

- b) PSO2: Graduate will be able to analyse, interpret and provide solutions to the real life Mechanical Engineering problems.
- c) PSO3: Ability to function on Multidisciplinary Area to attain professional and ethical responsibilities.

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

**SSR1S1:  
Technical English**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Apply various technical terms and terminologies practically
- The course aims at developing the fundamentals of Technical English and mastery in the professional writing like Business letters, Business correspondence, designing Business Memorandum, Resume and E-mail writing.
- Will be able to write formal and informal reports in work place.
- Will have complete knowledge of comprehending different passages and Precis writing.
- Apply various grammatical skills practically.

**AMR2C1:  
Applied Mathematics-II**

**Learning Outcomes:**

Upon completing the course, students will be able to:

- Express a linear map between finite-dimensional vector spaces with a matrix, calculate the electrical properties of a circuit, with voltage, amperage, resistance, etc. with matrix arithmetic, use them in 3D geometry (e.g. computer graphics), can try to improve linear solvers efficiency. Matrices can also represent quadratic forms (for example, in analysis to study hessian matrices, which help us to study the behaviour of critical points) and also computers run Markov simulations based on stochastic matrices in order to model events ranging from gambling through weather forecasting to quantum mechanics.
- Use differential equations to model natural phenomena, engineering systems and many other situations like exponential growth and decay, the population growth of species or the change in investment return over time, describing the movement of electricity, in modelling chemical reactions, in finding optimum investment strategies, describing the motion of waves, pendulums or chaotic systems.
- Handle probability distributions, to indicate the likelihood of an event or outcome, which are used for making forecasts and risk assessments. Pdf's are quite important and widely used in insurance, engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.
- Use fitted curves as an aid for data visualization, to infer values of a function where no data are available, and to summarize the relationships among two or more variables.
- Apply Fuzzy sets and logic to reason like a human in terms of linguistic variables, design Traffic monitoring systems, AC and heating ventilation, Gene Expression data analysis, Facial pattern recognition, Weather forecasting systems and many more.

**APR2C2:  
Applied Physics**

**Learning Outcomes:**

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



**MER2C3:  
Engineering Drawing**

**Learning Outcomes:**

- Upon Completing the Course, Student will able to:
- Understand the importance of BIS and ISO Standards in Engineering Drafting.
- Graphically construct and understand the importance of mathematical curves in engineering applications.
- Visualize geometrical solids in 3D space through exercises in Orthographic Projections.
- Interpret Orthographic, Isometric and Perspective views of objects.
- Develop the surfaces of geometrical solids.

**EIR2C4:  
Electrical Engineering**

**Learning Outcomes:**

Upon completing the course, students will be able :

- To solve circuit problems based on KVL,KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .
- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in 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++**

**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.

**AMR3C1  
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.
- 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 where analytical methods seem to fail, like solving highly nonlinear equation, numerical methods work very well.

**MER3C2  
STRENGTH OF MATERIALS**

**Learning Outcomes:**

Upon Completing the Course, Student will be 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 be 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 THERMODYNAMICS**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
- To understand the basic concepts of heat transfer and work transfer involved in the process.
- Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

**MER3L1  
WORKSHOP/PRACTICALS SEMINAR**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
- To understand the basic concepts of heat transfer and work transfer involved in the process.
- Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

**SMR3S3  
EFFECTIVE COMMUNICATION SKILLS**

**Learning Outcomes:**

Upon Completing the Course, Student will be 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**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- After studying this subject the students will be able to visualize the industrial operations with respect to Productivity.
- After studying this subject the students will be able to visualize Production Operations, Quality and Optimisation of industrial processes.
- This subject will help the student to understand the concepts of Industrial Engineering in higher semester of this course.

**MER4C2  
THEORY OF MACHINES**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Understand the concept of mechanisms and their applications
- Analyze the motion aspects of mechanisms.
- Understand the Gears and their uses.

- Learn basic fundamentals associated with Gyroscopic effect.

### **MER4C3 MACHINE DESIGN & DRAWING**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Perform free hand sketching of machine parts with standard of machine drawing.
- Select engineering materials based on their mechanical properties.
- Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints.
- Design and draw the simple machine elements such as keys, cotters, knuckles, riveted joints, welded joints and couplings using CAD/CAM software.

### **MER4C4 FLUID MECHANICS**

**Learning Outcomes:**

Upon Completing the Course, Student will able to

- Well established concepts of the theory of fluid mechanics
- Develop bases of analyses in fluid mechanics
- Understand the fundamental mechanics involved in different fluid flow cases in applications
- Develop a base for Computational Fluid Dynamics (CFD)

### **MER4G2 MECHNOTRONIC**

**Learning Outcomes:**

Upon completing the course, student will able to:

- Acquire the basic knowledge for the application of the core technologies in the areas of mechanics, electronics and information processing to the solution of problems.
- Recognize the need for models of the systems in order to predict their behavior.
- Select and integrate the appropriate devices for the pickup, conditioning and display of signals related to the various processes involved in a mechatronic system..
- Select the suitable actuation and control system for a mechatronic application.

### **MER4L2 WORKSHOP /PRACTICALS MECHATRONICS**

**Learning Outcomes:**

Upon completing the course, student will able to:

- Acquire the basic understanding of the characteristics of various sensors and transducers used in mechatronic and measurement systems.
- Select the suitable devices and arrange them in the circuit for the control of actuators using hydraulic and pneumatic means.

- Acquire the basic understanding of common mechatronic systems.

### **SMR4S4 ENGINEERING ECONOMICS**

**Learning Outcomes:**

- Upon completing the course, students will be able to:
- Understand major principles of economic analysis for decision making among alternative courses of action in engineering.

### **MER5C2 MACHINE DESIGN-I**

**Learning Outcomes:**

After Completing the Course, Student will be able to:

- Have the importance, role and concept of design
- Learn to apply the knowledge of material science in real life situations.
- Design the basic machine elements like spring, cylinder etc.
- Know about the latest stress analysis techniques

### **MER5C1 DYANAMICS OF MACHINE**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Determine the Forces and Torques due to Friction in Bearings, Clutches and Belt Drives.
- Determine the Forces and Torques due to Friction in Brakes and Vehicle Propulsion.
- Determine the Forces and Torques in Reciprocating Engines.
- Determine the Forces and Torques in Governor Mechanisms.
- Determine the unbalancing Forces / Torques in Engines and Machines and to balance this Forces/Torques.

### **MER5C3 HEAT TRANSFER**

**Learning outcomes:**

Upon Completing the Course, Student will be able to:

- List and Tabulate the Temperature Measuring Devices.
- Determine the thermal conductivity of an insulating powder.
- Calculate the overall heat transfer coefficient and intermediate temperatures in Composite Wall Apparatus
- Effectiveness and efficiency of pin fin by using pin fin apparatus
- Determine and verify the value of Stefan Boltzmann constant experimentally..
- Determine the effectiveness and overall heat transfer coefficient of Parallel and Counterflow type Heat Exchanger.
- Determine the effectiveness and overall heat transfer coefficient of Shell and tube type Heat Exchanger

**MER5C4**  
**IC ENGINE AND JET PROPULSION**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Determine the air fuel ratio supplied by carburettor and MPFI system.
- Determine the thermochemistry of fuels.
- Design and select the combustion chambers of SI Engines.
- Draw the valve timing diagram of SI Engines( Two and Four Stroke).
- Determine the Torque/Mean effective pressure / BHP/FHP/IHP/volumetric efficiency/Brake thermal efficiency/Specific fuel consumption and other parameters of engines.

**MER5G1**  
**PRODUCTION ENGINEERING-I**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Understand the design features of the machine tools and tooling like jigs-fixtures and select them appropriately for different production processes and environments.
- Understand the basic processes and set-ups used to produce sheet metal parts.
- Understand some of the contemporary design methodologies used for the design and manufacture of parts.
- Learn about basics of production systems and automation in materials handling and assembly systems.

**MER5L3**  
**WORKSHOP /PRACTICALS**  
**MACHINE DESIGN-I**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Get the practical knowledge of designing the various components of Internal Combustion Engine.
- Learn the market survey practice.
- Get practice of literature survey.
- Learn to work in a team.

**SMR5S5**

**PRINCIPLES AND PRACTICE OF MANAGEMENT**

**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.

### **MER6C1 MACHINE DESIGN -II**

#### **Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Design the various components of Internal Combustion Engine.
- Design the components under Dynamic Loading.
- Understand the applications of seals & gaskets.
- The different types of failure mode in mechanical components.

### **MER6C2 PRODUCTION ENGINEERING-II**

#### **Learning Outcomes:**

Upon completing the course, student will be able to:

- Learn the effect of various parameters on the metal cutting process.
- Learn the mechanics of bulk metal forming processes and select the equipment and tooling needed for the various forming operations
- Understand the importance of surface finish of manufactured parts and learn about the various methods to improve it.
- Learn about the powder metallurgy processes and about the processing of ceramics and composites.
  
- measure the forces generated at the chip tool interface during machining operations.

### **MER6C3 FLUID MACHINE**

#### **Learning Outcomes:**

Upon completing the course, student will be able to

- Apply well-established concepts of the theory of fluid machines.
- Select Proper fluid machines.
- Operate and develop insight in maintenance.
- Develop a base for Computational Fluid Dynamics (CFD).



## **MER6C4 ENERGY CONVERSION SYSTEM**

### **Learning outcomes:**

Upon Completing the Course, Student will be able to:

- Determine the overall efficiency of steam power plant through various arrangements of vapour power cycles.
- Determine the thermo chemistry of fuels and Actual air and Coal required in Furnace of boilers
- Understand the working of actual power boilers used in steam power plants, its chimney calculation and to perform the boiler trial for efficiency and input / output of heat
- Understand the working of steam nozzles and diffusers and determine the performance parameters and efficiency of steam nozzles
- Determine the Diagram Power, Gross Stage Efficiency, Specific steam consumption and Design parameters of steam turbines.
- Understand the construction, operation and Maintenance of Steam Turbines and its auxiliaries.
- Determine the performance parameters of Condensers, air pumps, cooling Towers.

## **MER6G1 MATERIALS MANAGEMENT**

### **Learning 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**

### **Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Get the practical knowledge of designing the various components of Internal Combustion Engine.
- Learn the market survey practice.
- Get practice of literature survey.
- Learn to work in a team.

**SMR6S6**  
**ENTREPRENEURSHIP DEVELOPMENT & IPR**

**Learning Outcomes:**

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

- Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
- Understand entrepreneurial process by way of studying different cases and performing class activities.

**MER7C1**  
**OPERATION RESERCH**

**Learning Outcomes:**

- Students will be able to apply linear programming models in different practical situations.
- Students will be able to optimize the resources different conditions.
- Students will be able to know the various situation for queuing in service and industrial situations.
- Students will be able to know the various strategies required in business decisions using game theory.
- Students will be able to know the project implementation and control techniques using network analysis.

**MER7C2**  
**MACHINE DESIGN -III**

**Learning Outcomes:**

Upon completing the course, student will be able to:

- Design the machine components on the basis of Reliability.
- Optimize the mechanical component design.
- Design the component under high temperature condition.
- Determine the arrangement and layout for tool drive design.
- Evaluate and Design the Unsymmetrical component subjected to loading condition.

**MER7C3**  
**REFRIGERATION AND AIR- CONDITIONING**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Understand the design and working principles of Refrigeration and Air-Conditioning systems.
- Select Refrigeration and Air-Conditioning system components.
- Learn advance subjects of Refrigeration and Air-Conditioning .
- Industry ready for Refrigeration and Air-Conditioning industry.

## **MER7E1 SQC&TQM**

### **Learning Outcomes:**

Upon completing the course, student will be able to:

- Understand the concept of Quality and basic statistical concepts.
- Preparation of Process control chart in the different industrial process.
- Understand the concepts of Acceptance Sampling.
- Apply the basics of Total Quality Management and its implementation.
- know the system reliability concept and ISO standards.

## **MER7E2 ARTIFICIAL INTELLIGENCE**

### **Learning Outcomes:**

Upon completing the course, student will be able to:

- Familiar with the history, concept of Artificial Intelligence.
- Familiar with Expert Systems and Machine Learning processes.
- Understand, analyse and solve problems in the fuzzy logic systems, Crisp sets and fuzzy sets.

## **MER7E3 ROBOTICS**

### **Learning Outcomes:**

- Familiar with the history, concept development and key components of robotics technologies.
- Familiar with various robot sensors and their perception principles that enable a robot to analyse their environment, reason and take appropriate actions toward the given goal.
- Understand, analyse and solve problems in spatial coordinate representation and spatial transformation, robot locomotion design, kinematics, motion control.

## **MER7E4 TRIBOLOGY**

### **Learning Outcomes:**

Upon completing the course, student will be able to:

- Understand and importance of Tribological phenomenon
- Optimize the friction and wear rate.
- Understand the wear mechanism.
- Determine the application of Lubricants.

## **MER7E5 COMPUTATIONAL FLUID DYNAMICS**

### **Learning Outcomes:**

- Understand the various flow situations numerically
- Analyse the flow patterns studied in fluid mechanics
- Simulate the various flow situations
- Apply optimisation methods to find most optimum solution.

**MER8C1**  
**PRODUCTION & OPERATION MANAGEMENT**

**Learning Outcomes:**

Upon completing the course student will be able to:

- Understand the fundamentals of Production & Operations Management.
- Apply techniques of demand forecasting in practical situations.
- Take decisions related to plant locations and plant layout.
- Understand the basics of aggregate planning and scheduling systems.
- Know the techniques related to materials requirement, maintenance of production system.

**MER8C2**  
**VIBRATION & NOISE CONTROL**

**Learning 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**

**Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Understand the design and working principles of Chassis systems of automobiles.
- Understand the specifications of automobiles.
- Understand the working of all systems of automobiles.
- Learn advanced system of automobiles.
- Industry ready for Automotive industry.

**MER8E1**  
**CAD/CAM**

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

- Understand the importance of CAD/CAM principles in the Product development.
- Develop programs related to manufacturing using codes.
- Analyse the importance of networking in manufacturing environment.

## **MER8E2 RELIABILITY ENGINEERING**

### **Learning 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**

### **Learning Outcomes:**

Upon Completing the Course, Student will able to:

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

## **MER8E4 POWER PLANT ENGINEERING**

### **Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Understand the phenomenon of compressible liquids.
- Understand the phenomenon of flow through nozzles & diffusers.
- Understand the phenomenon of sound waves.
- Understand the phenomenon of shock waves.
- Understand the principles of Flow in constant area ducts with friction.

## **MER8E5 GAS DYNAMICS**

### **Learning Outcomes:**

Upon Completing the Course, Student will able to:

- Understand the phenomenon of compressible liquids.
- Understand the phenomenon of flow through nozzles & diffusers.
- Understand the phenomenon of sound waves.
- Understand the phenomenon of shock waves.
- Understand the principles of Flow in constant area ducts with friction.

- Understand Behavior of Gas under various conditions.
- Use the Gas tables
- Understand basics of compressible flow
- Correlate fundamentals of Gas Dynamics with various mechanical systems



## **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.



## **M.E Programmes**

### **PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

PEO1: To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms

PEO2: To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise

PEO3: To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, research, design and implementation skills

PEO4: To prepare graduates who will thrive to pursue life-long reflective learning to fulfill their goals

### **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.

**ME (Information Technology) with Specialization in Information Security List of PO,PSO,CO for CBCS (Full Time)**

<b>SEM I</b>				
<b>S.NO</b>	<b>Sub Code</b>	<b>Sub Name</b>	<b>Number of Credit L-T-P</b>	<b>Sub Type</b>
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	
<b>Total Credit for SEM I</b>			<b>28 actual + 4 Virtual credits</b>	
		<b>List of Generic Elective I</b>	<b>L-T-P</b>	
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	
		<b>List of Elective I</b>	<b>L-T-P</b>	
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	
<b>SEM II</b>			<b>L-T-P</b>	
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	
<b>Total Credit for SEM II</b>			<b>28 actual + 4 Virtual credits</b>	
		<b>List of Generic Elective II</b>	<b>L-T-P</b>	
1.	ISR2G1	Cloud Computing	3-1-0	
2.	ISR2G2	Applied Cryptography	3-1-0	
3.	ISR2G3	Cyber Crime and Information Warfare	3-1-0	
		<b>List of Elective II</b>	<b>L-T-P</b>	
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	
<b>SEM III</b>	ISR3D1	Dissertation Phase I	0-0-12	
	ISR3V3	Comprehensive Viva III	0-0-4	
<b>Total Credit for SEM III</b>			<b>12 actual + 4 Virtual credits</b>	
<b>SEM IV</b>	ISR3D2	Dissertation Phase II	0-0-12	
	ISR4V4	Comprehensive Viva IV	0-0-4	
<b>Total Credit for SEM IV</b>			<b>12 actual + 4 Virtual credits</b>	
<b>Total Credit</b>			<b>80 actual + 16 Virtual credits</b>	

## **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 course student will be able to :**

perform variety of advanced techniques, methods and results from the rapidly-developing field of algorithms to solve problems. To 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 Mechanical Engineering (Design & Thermal) (Full Time)

### LIST OF PO,PSO,CO for CBCS

<b>SEM I</b>				
<b>S.NO</b>	<b>Sub Code</b>	<b>Sub Name</b>	<b>Number of Credit</b>	<b>Sub Type</b>
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.		<b>Generic Elective I</b>	3-1-0 =4	GE1
5.		<b>Elective I</b>	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	
<b>Total Credit for SEM I</b>			<b>28 actual + 4 Virtual credits</b>	
<b>List of Generic Elective I</b>				
1.	<b>DTR1G1</b>	<b>Advanced Thermodynamics</b>		
2.	DTR1G2	Non Conventional Energy Systems		
3.	DTR1G3	Management Information System		
4.	DTR1G4	Finite Element Analysis		
<b>List of Elective I</b>				
1.	<b>DTR1E1</b>	<b>Advanced Mechanics of Solids</b>		
2.	DTR1E2	Fatigue Creep and Fracture		
3.	DTR1E3	Mechanism and Robot Kinematics		
4.	DTR1E4	Thermal Systems : Simulation and Design		
<b>SEM II</b>				
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.		<b>Generic Elective II</b>	3-1-0 =4	GE2
5.		<b>Elective II</b>	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	
<b>Total Credit for SEM II</b>			<b>28 actual + 4 Virtual credits</b>	
<b>List of Generic Elective II</b>				
1.	<b>DTR2G1</b>	<b>Advanced Heat Transfer</b>		
2.	DTR2G2	Rapid Prototyping		
3.	DTR2G3	Cogeneration and Waste Heat Recovery		
4.	DTR2G4	Mechatronics in Manufacturing Systems		
<b>List of Elective II</b>				
1.	<b>DTR2E1</b>	<b>Machine Vibrations Analysis</b>		
2.	DTR2E2	Experimental Stress Analysis		
3.	DTR2E3	Applied Elasticity and Plasticity		
4.	DTR2E4	Automotive Systems: Analysis and Design		
<b>SEM III</b>	DTR3D1	Dissertation Phase I	0-0-12=12	
	DTR3V3	Comprehensive Viva III	0-0-4=4	
<b>Total Credit for SEM III</b>			<b>12 actual + 4 Virtual credits</b>	
<b>SEM IV</b>	DTR4D2	Dissertation Phase II	0-0-12=12	
	DTR4V4	Comprehensive Viva IV	0-0-4=4	
<b>Total Credit for SEM IV</b>			<b>12 actual + 4 Virtual credits</b>	
<b>Total Credits</b>			<b>80 actual + 16 Virtual credits</b>	



## **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 CREEP AND 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 THERMODYNAMICS**

**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**

#### **MACHINERY FAULT DIAGNOSIS & SIGNAL PROCESSING**

##### **COURSE OUTCOMES:**

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

- Student will be able to deal with the analysis of faults generated inside the machine during the operations. And will have knowledge of the methods used for the prevention of the faults and also the approach for

### **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. 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
<b>Actual Credits per Semester</b>		<b>28</b>	<b>28</b>	<b>12</b>	<b>12</b>
<b>Total actual Programme Credits</b>					<b>80</b>
7.	Virtual Credited Comprehensive Viva	4	4	4	4
<b>Total Credits per Semester</b>		<b>32</b>	<b>32</b>	<b>16</b>	<b>16</b>
<b>Total Programme Credits</b>					<b>96</b>



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Software Engineering  
LIST OF PO,PSO,CO  
Batch 2015– 2016 and Onwards**

<b>SEM I</b>				
<b>S.NO</b>	<b>Sub Code</b>	<b>Sub Name</b>	<b>Number of Credit L-T-P</b>	<b>Sub Type</b>
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	
<b>Total Credit for SEM I</b>			<b>28 actual + 4 Virtual credits</b>	
<b>List of Generic Elective I</b>			<b>L-T-P</b>	
1.	SER1G1	Soft Computing	3-1-0	
2.	SER1G2	Distributed Operating System	3-1-0	
3.	SER1G3	Advance Computer Architecture	3-1-0	
<b>List of Elective I</b>			<b>L-T-P</b>	
1.	SER1E1	Database Engineering	3-1-1	
2.	SER1E2	Big Data Analytics	3-1-1	
3.	SER1E3	Secure Software Engineering	3-1-1	
<b>SEM II</b>			<b>L-T-P</b>	
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	
<b>Total Credit for SEM II</b>			<b>28 actual + 4 Virtual credits</b>	
<b>List of Generic Elective II</b>			<b>L-T-P</b>	
1.	SER2G1	Data Mining & Warehousing	3-1-0	
2.	SER2G2	Cloud Computing	3-1-0	
3.	SER2G3	Simulation and Modelling	3-1-0	
<b>List of Elective II</b>			<b>L-T-P</b>	
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  
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Curriculum & Syllabus  
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	
<b>Total Credit for SEM III</b>			<b>12 actual + 4 Virtual credits</b>	
SEM IV			L-T-P	
1	SER4D2	Dissertation Phase II	0-0-12	
2	SER4V4	Comprehensive Viva IV	0-0-4	
<b>Total Credit for SEM IV</b>			<b>12 actual + 4 Virtual credits</b>	
<b>Total Credit</b>			<b>80 actual + 16 Virtual credits=96</b>	

## **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.

**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:

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:**

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.

**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.

## **Program Outcomes (POs)**

### **Master of Sciences**

A Master of Science student will be able to:

PO1: Create more interest in the subject and motivated towards self-learning.

PO2: Strengthen the logical reasoning, which is the main ingredient to understand subjective concepts and to inculcate the habit of making observations and experimentation and arrive at the final result.

PO3: Acquire the communication skill to take up a career in either Teaching their subject at various levels including schools, colleges, universities, etc or as a researcher and analyst or in professional courses.

PO4: Communicate effectively both orally and in writing, work effectively in teams, exhibit ethical and professional behaviour.

PO5: Demonstrate knowledge and understanding of the underlying principles and apply these to one's own work, as a member and leader in a team, manage projects in multidisciplinary environments.

PO6: Propose new questions and suggest possible software packages and/or computer programming to find solutions to these questions.

PO7: Identify, formulate, research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematical, biological, physical and chemical sciences, programming and so on.



## **Program Specific Outcomes (PSOs)**

### **M.Sc. Applied Mathematics (with specialization in Computing and Informatics)**

The post graduates of the M.Sc. Applied Mathematics (with specialization in computing and Informatics) will:

PSO1: Develop core skills in Applied Mathematics and methods that find use in science, engineering, business, computer science, and industry. And allows to specialise in industrial modelling or numerical analysis, in preparation for study towards a PhD or a career using Mathematics within industry.

PSO2: Be enriched with analytical skills, problem solving and communication skills as well as independently design, develop and implement computer applications.

PSO3: Enhance career opportunities and bring themselves at par with professional courses.