

DEPARTMENT OF MECHANICAL ENGINEERING

SEM-I

LINEAR ALGEBRA & CALCULUS

CO NO	COURSE OUTCOMES
CO1	Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
CO2	Utilize mean value theorems to real life problems.
CO3	Familiarize with functions of several variables which is useful in optimization.
CO4	Learn important tools of calculus in higher dimensions.
CO5	Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

ENGINEERING PHYSICS

CO NO	COURSE OUTCOMES
CO1	Analyze the intensity variation of light due to polarization, interference and diffraction.
CO2	Familiarize with the basics of crystals and their structures.
CO3	Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
CO4	Summarize various types of polarization of dielectrics and classify the magnetic Materials
CO5	Explain the basic concepts of Quantum Mechanics and the band theory of solids.
CO6	Identify the type of semiconductor using Hall effect.

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

CO NO	COURSE OUTCOMES
CO1	Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
CO2	Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.
CO3	Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.
CO4	Analyze different electrical circuits, performance of machines and measuring instruments.
CO5	Evaluate different circuit configurations, Machine performance and Power systems operation.

ENGINEERING GRAPHICS

CO NO	COURSE OUTCOMES
CO1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
CO3	Understand and draw projection of solids in various positions in first quadrant.
CO4	Explain principles behind development of surfaces.
CO5	Prepare isometric and perspective sections of simple solids.

INTRODUCTION TO C PROGRAMMING

CO NO	COURSE OUTCOMES
CO1	Understand basics of computers, the concept of algorithm and algorithmic thinking.
CO2	Analyse a problem and develop an algorithm to solve it.
CO3	Implement various algorithms using the C programming language.
CO4	Understand more advanced features of C language.
CO5	Develop problem-solving skills and the ability to debug and optimize the code

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II-SEM

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

CO NO	COURSE OUTCOMES
CO1	Solve the differential equations related to various engineering fields.
CO2	Identify solution methods for partial differential equations that model physical processes.
CO3	Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO4	Estimate the work done against a field, circulation and flux using vector calculus.

ENGINEERING CHEMISTRY

CO NO	COURSE OUTCOMES
CO1	Demonstrate the corrosion prevention methods and factors affecting corrosion.
CO2	Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers.
CO3	Explain calorific values, octane number, refining of petroleum and cracking of oils.
CO4	Explain the setting and hardening of cement.
CO5	Summarize the concepts of colloids, micelle and nanomaterials.

BASIC CIVIL AND MECHANICAL ENGINEERING

CO NO	COURSE OUTCOMES
CO1	Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
CO2	Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
CO3	Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.
CO4	Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.
CO5	Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

ENGINEERING MECHANICS

CO NO	COURSE OUTCOMES
CO1	Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
CO2	Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.
CO3	Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.
CO4	Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
CO5	Solve the problems involving the translational and rotational motion of rigid bodies.

BASIC CIVIL & MECHANICAL ENGINEERING

CO NO	COURSE OUTCOMES
CO1	Understand the different manufacturing processes.
CO2	Explain the basics of thermal engineering and its applications.
CO3	Describe the working of different mechanical power transmission systems and power plants.
CO4	Apply the principles of work-energy and impulse-momentum to solve the problems of Rectilinear and curvilinear motion of a particle.

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SEM-III

Thermo dynamics

CO NO	COURSE OUTCOMES
CO1	Explain the importance of thermodynamic properties related to conversion of heat energy into work.
CO2	Apply the Zeroeth and First Law of Thermodynamics.
CO3	Understand Second Law of Thermodynamics.
CO4	Analyze the Mollier charts, T-S and h-s diagrams, Steam calorimetry, Phase Transformations.
CO5	Evaluate the COP of refrigerating systems and properties, processes of psychrometry and sensible and latent heat loads.

Mechanics of Solids

CO NO	COURSE OUTCOMES
CO1	Learn all the methods to analyze beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components.
CO2	Analyse beams and draw correct and complete shear and bending moment diagrams for beams.
CO3	Apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, and moments.
CO4	Model & Analyze the behavior of basic structural members subjected to various loads.
CO5	Design and analysis of Industrial components like pressure vessels Material Science and Metallurgy.

Numerical Methods and Transform Techniques

CO NO	COURSE OUTCOMES
CO1	Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals
CO2	Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations
CO3	Apply the Laplace transform for solving differential equations.
CO4	Find or compute the Fourier series of periodic signals
CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms

Universal Human Values– Understanding Harmony & Ethical Human Conduct

CO NO	COURSE OUTCOMES
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity
CO2	Identify one's self, and one's surroundings (family, society nature).
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life.
CO4	Relate human values with human relationship and human society.
CO5	Justify the need for universal human values and harmonious existence.
CO6	Develop as socially and ecologically responsible engineers

MATERIAL SCIENCE & METALLURGY

CO NO	COURSE OUTCOMES
CO1	Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.
CO2	Study the behaviour of ferrous and non-ferrous metals and alloys and their application in different domains.
CO3	Understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals.
CO4	Grasp the methods of making of metal powders and applications of powder metallurgy.
CO5	Comprehend the properties and applications of ceramic, composites and other advanced methods.

ENVIRONMENTAL SCIENCE

CO NO	COURSE OUTCOMES
CO1	Grasp multi-disciplinary nature of environmental studies and various renewable and non-renewable resources.
CO2	Understand flow and bio-geo-chemical cycles and ecological pyramids.
CO3	Understand various causes of pollution and solid waste management and related preventive measures
CO4	Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation
CO5	Illustrate the causes of population explosion, value education and welfare programs.

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SEM-IV

COMPLEX VARIABLES, PROBABILITY AND STATISTICS

CO NO	COURSE OUTCOMES
CO1	Apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
CO2	Make use of the Cauchy residue theorem to evaluate certain integrals (L3)
CO3	Infer the statistical inferential methods based on small and large sampling tests (L4)
CO4	Find the differentiation and integration of complex functions used in engineering problems (L5)
CO5	Design the components of a classical hypothesis test (L6)

INDUSTRIAL MANAGEMENT

CO NO	COURSE OUTCOMES
CO1	Learn about how to design the optimal layout
CO2	Demonstrate work study methods
CO3	Explain Quality Control techniques
CO4	Discuss the financial management aspects
CO5	Understand the human resource management methods.

MANUFACTURING PROCESSES

CO NO	COURSE OUTCOMES
CO1	Design the patterns and core boxes for metal casting processes.
CO2	Understand the different welding processes
CO3	Demonstrate the different types of bulk forming processes
CO4	Understand sheet metal forming processes
CO5	Learn about the different types of additive manufacturing Processes

FLUID MECHANICS & HYDRAULIC MACHINES

CO NO	COURSE OUTCOMES
CO1	Understand the basic concepts of fluid properties.
CO2	Estimate the mechanics of fluids in static and dynamic conditions.
CO3	Apply the Boundary layer theory, flow separation and dimensional Analysis.
CO4	Estimate the hydro dynamic forces of jet on vanes indifferent Positions.
CO5	Understand the working Principles and performance evaluation of Hydraulic pump and turbines.

THEORY OF MACHINES

CO NO	COURSE OUTCOMES
CO1	Understand different mechanisms and their inversions.
CO2	Calculate velocity and acceleration of different links in a mechanism.
CO3	Apply the effects of gyroscopic couple in ships, aero planes and road Vehicles.
CO4	Evaluate unbalance mass in rotating machines.
CO5	Analyze free and forced vibrations of single degree freedom systems.

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MACHINE TOOLS & METROLOGY

CO1	Learned the fundamental knowledge and principals in material removal process.
CO2	Acquire the knowledge on operations in conventional, automatic, Capstan and turret lathes.
CO3	Capable of understanding the working principles and operations of shaping, slotting, planning, drilling and boring machines.
CO4	Able to make gear and keyway in milling machines and understand the indexing mechanisms.
CO5	Understand the different types of Surface roughness and Optical measuring instruments.

THERMAL ENGINEERING

CO1	Explain the basic concepts of air standard cycles.
CO2	Get knowledge about IC Engines and Biolers.
CO3	Discuss the concepts of steam nozzles and steam turbines and steam condensers.
CO4	Gain knowledge about the concepts of compressors and gas turbines.
CO5	Acquire insights about jet propulsion, rockets and solar engineering.

DESIGN OF MACHINE ELEMENTS

CO1	Design the machine members subjected to static and dynamic loads.
CO2	Design shafts and couplings for power transmission.
CO3	Learn how to design bolted and welded joints.
CO4	Know the design procedures of clutches, brakes and springs.
CO5	Design bearings and gears.

RENEWABLE ENERGY TECHNOLOGIES

CO1	Illustrate the importance of solar radiation and solar PV modules.
CO2	Discuss the storage methods in PV systems
CO3	Explain the solar energy storage for different applications
CO4	Understand the principles of wind energy, and bio-mass energy.
CO5	Attain knowledge in geothermal energy, ocean energy and fuel cells.

NON- DESTRUCTIVE EVALUATION

CO1	Understand the concepts of various NDE techniques and the requirements of radiography techniques and safety aspects.
CO2	Interpret the principles and procedure of ultrasonic testing
CO3	Understand the principles and procedure of Liquid penetration and eddy current testing
CO4	Illustrate the principles and procedure of Magnetic particle testing
CO5	Interpret the principles and procedure of infrared testing and thermal testing

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SEM-VI

HEAT TRANSFER

CO1	Find heat transfer rate for 1D, steady state composite systems with heat generation and performance of pins.
CO2	Understand the concepts transient heat conduction and basic laws involved in the convection heat transfer.
CO3	Apply the empirical equations for forced convection and free convection problems
CO4	Examine the rate of heat transfer with phase change and in the heat exchangers.
CO5	Illustrate the concepts of radiation heat transfer

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

CO1	Explain the basic concepts of artificial intelligence.
CO2	Learn about the principles of supervised learning methods.
CO3	Gain knowledge in unsupervised learning method and Bayesian algorithms.
CO4	Get knowledge about neural networks and genetic algorithms.
CO5	Understand the machine learning analytics and apply deep learning techniques.

FINITE ELEMENT METHODS

CO1	Understand the concepts behind variational methods and weighted residual methods in FEM .
CO2	Solve bar and truss problems.
CO3	Solve beam problems.
CO4	Apply suitable boundary conditions for 2D stress analysis and develop the formulation for axi-symmetric problems and higher order iso-parametric elements.
CO5	Evaluate the concepts of steady state heat transfer analysis and dynamic analysis

ADVANCED MANUFACTURING PROCESSES

CO1	Explain the working principle of various nonconventional machining processes and their applications.
CO2	Explain the working principles of additive manufacturing methods.
CO3	Understand various laser material processing techniques.
CO4	Gain on Advanced coating processes.
CO5	Describe various fabrication methods for microelectronic devices.

INDUSTRIAL ROBOTICS

CO1	Discuss various applications and components of industrial robot systems.
CO2	Learn about the types of actuators used in robotics.
CO3	Calculate the forward kinematics and inverse kinematics
CO4	Learn about programming principles and languages for a robot control system.
CO5	Discuss the applications of image processing and machine vision in robotics