

Department of Mechanical Engineering

Program Outcomes (POs) & Program Specific Outcomes (PSOs)

Program Outcomes (POs)	
Mechanical Engineering Graduates will be able to:	
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, and basic engineering fundamentals to the solution of complex engineering problems in the major areas of Mechanical engineering.
PO2	Problem analysis: Identify, formulate, review research literature and analyze complex Mechanical engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences and engineering sciences.
PO3	Design/development of solutions: Design solutions for the complex Mechanical Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for 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 modelling 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 Mechanical engineering practices.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge for sustainable development.

Program Outcomes (POs)**Mechanical Engineering Graduates will be able to:**

PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the professional Mechanical engineering practices.
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, and are 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 in multidisciplinary environment.
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 changes.

Program Specific Outcomes (PSO)

PSO1	Identify societal problems related to mechanical engineering; solve them by applying the mechanical and allied engineering knowledge and tools, for the benefits of the society.
PSO2	Apply the knowledge of Mechanics, Thermal science and Manufacturing to meet the needs of the industry and society.
PSO3	Enable the students to design, analyze and evaluate the Mechanical engineering components and systems through innovative projects and products incubation.

Department of Mechanical Engineering

Course Outcomes (COs)

YEAR: I

SEMESTER: I

Subject: COMMUNICATIVE ENGLISH

CO1	After completion of the course, Students are able to, Read articles of a general kind in magazines and newspapers.
CO2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
CO3	Comprehend conversations and short talks delivered in English
CO4	Write short essays of a general kind and personal letters and emails in English.
CO5	Learners confidently face to overseas people to converse their idea and thought possibly.

Subject: ENGINEERING MATHEMATICS I

CO1	After completion of the course, Students are able to, Solve Matrices using Eigen values and vectors.
CO2	Solve sequences and series using various tests
CO3	Analyze the applications of different calculus.
CO4	Solve the different calculus of several variables using Taylor's series and Lagrange's method.
CO5	Differentiate co-ordinates using multiple integrals.

Subject: ENGINEERING PHYSICS

CO1	After completion of the course, Students are able to, Design different various crystal Atomic structures.
CO2	Apply the concepts of Elasticity and thermal physics in real time.
CO3	Describe the concepts of Quantum physics.
CO4	Describe the production of sounds and to solve the practical problems.
CO5	Apply interpret working principle of LASER and fibre optic communication.

Subject: ENGINEERING CHEMISTRY

CO1	After completion of the course, Students are able to, Analyze the techniques of polymerization
CO2	Apply the laws of thermodynamics in all engineering disciplines.
CO3	Test the samples with concepts of important photo chemical processes and analytical spectroscopy.
CO4	Understanding of the basic concepts of phase rule and its applications to one and two component systems
CO5	Prepare the synthesis of carbon nano tubes.

Subject: PROBLEM SOLVING AND PYTHON PROGRAMMING

CO1	After completion of the course, Students are able to, Develop algorithmic solutions to simple computational problems.
CO2	Read, write, execute by hand simple Python programs.
CO3	Structure simple Python programs for solving problems.
CO4	Decompose a Python program into functions.
CO5	Represent compound data using Python lists, tuples, and dictionaries.

Subject: ENGINEERING GRAPHICS

CO1	After completion of the course, Students are able to, Familiarize with the fundamentals and standards of engineering graphics
CO2	Perform free hand sketching of basic geometrical construction and multiple views of objects
CO3	Project orthographic projections of lines and plane surfaces
CO4	Draw projection of solids and development of surfaces
CO5	Visualize, project isometric and perspective section of simple solids
CO6	Solve specific geometrical problems in engineering applications

Subject: PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

CO1	After completion of the course, Students are able to, Make use of office software, presentation and visualization tools.
CO2	Apply programming design method for the given program.
CO3	Implement C programs for the given simple problems.
CO4	Develop recursive programs using functions.
CO5	Experiment with the concepts of structure and union and develop program using them.

Subject: PHYSICS AND CHEMISTRY LABORATORY

CO1	After completion of the course, Students are able to, Determine the Wavelength and particle size using Laser and acceptance angle in an optical fiber.
CO2	Determine velocity of sound and compressibility of liquid – Ultrasonic interferometer.
CO3	Determine thermal conductivity of a bad conductor – Lee’s Disc method.
CO4	Determine of specific resistance of a given coil of wire – Carey Foster’s Bridge.
CO5	Test on various types of water quality parameters like DO and chloride content.
CO6	Operate the pH meter to find the strength of solution.
CO7	Operate the different type of conductivity meter to find the conductance of solution.

SEMESTER-II

Subject: TECHNICAL ENGLISH

CO1	After completion of the course, Students are able to, Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
CO2	Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
CO3	Read different genres of texts adopting various reading strategies.
CO4	Listen / view and comprehend different spoken discourses/excerpts in different accents.
CO5	Learners confidently face to overseas people to converse their idea and thought possibly.

Subject: ENGINEERING MATHEMATICS – II

CO1	After completion of the course, Students are able to, Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
CO2	Gradient, divergence and curl of a vector point function and related identities.
CO3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
CO4	Analytic functions, conformal mapping and complex integration.
CO5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

Subject: MATERIALS SCIENCE

CO1	After completion of the course, Students are able to, Analyze the various phase diagrams and their applications.
CO2	Explain Fe-Fe ₃ C phase diagram, various microstructures and alloys.
CO3	Analyze mechanical properties of materials and their measurement.
CO4	Gain knowledge on magnetic, dielectric and superconducting properties of materials
CO5	Understand the basics of ceramics, composites and nanomaterials.

Subject: ENVIRONMENTAL SCIENCE AND ENGINEERING

CO1	After completion of the course, Students are able to, Serve the environmental Protection.
CO2	Create Public awareness of environmental is at infant stage.
CO3	Develop and improvement in standard of living has lead to serious environmental disasters.
CO4	Eradicate Ignorance and incomplete knowledge has lead to misconceptions.
CO5	Finding and implementing scientific, technological, economic and political solutions to environmental problems.

Subject: ENGINEERING MECHANICS

CO1	After completion of the course, Students are able to, Gain basic knowledge on effect of force and motion in carrying out design functions of engineering
CO2	Acquire knowledge on statics of particles
CO3	Solve problems involving friction
CO4	Determine the centroid, centre of gravity, moment of inertia of various surface and solids
CO5	Solve problems involving dynamics of particles and rigid bodies, Apply knowledge to solve engineering problems on both statics and dynamics of particles

Subject: BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING

CO1	After completion of the course, Students are able to, Understand Electric circuit laws, single and three phase circuits and wiring
CO2	Understand Working principles of Electrical Machines
CO3	Understand working principle of various electronic devices and measuring instruments
CO4	Understand the concepts of various electronic devices
CO5	Choose appropriate instruments for electrical measurement for a specific application

Subject: ENGINEERING PRACTICES LAB

CO1	After completion of the course, Students are able to, Demonstrate the plumbing and carpentry works.
CO2	Practice on welding, basic machining, sheet metal work and machine assembly.
CO3	Demonstrate on smithy, foundry and fitting operations.
CO4	Practice on residential house wiring, fluorescent lamp wiring and stair case wiring.
CO5	Identify the electrical quantities – voltage, current, power, power factor, energy and resistance.
CO6	Interpret the electronic components, CRO and logic gates.
CO7	Practice on generation of clock signal, soldering and measurement of ripple factor of HWR and FWR.

Subject: BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY

CO1	After completion of the course, Students are able to, Determine the speed characteristic of different electrical machines
CO2	Design simple circuits involving diodes and transistors
CO3	Use operational amplifiers

YEAR: II
SEMESTER: III

Subject: TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

CO1	After completion of the course, Students are able to, Understand how to solve the given standard partial differential equations.
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations
CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

Subject: ENGINEERING THERMODYNAMICS

CO1	After completion of the course, Students are able to, Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions
CO2	Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.
CO3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods
CO4	Derive simple thermodynamic relations of ideal and real gases
CO5	Calculate the properties of gas mixtures and moist air and its use in psychometric processes

Subject: FLUID MECHANICS AND MACHINERY

CO1	After completion of the course, Students are able to, Apply mathematical knowledge to predict the properties and characteristics of a fluid.
CO2	Analyse and calculate major and minor losses associated with pipe flow in piping networks.
CO3	Mathematically predict the nature of physical quantities
CO4	Critically analyse the performance of pumps
CO5	Critically analyse the performance of turbines.

Subject: MANUFACTURING TECHNOLOGY-I

CO1	After completion of the course, Students are able to, Understand the principles of foundry and casting
CO2	Choose material in manufacturing process based on their properties
CO3	Know various welding processes and its applications
CO4	Categorize various forging operations used in manufacturing.
CO5	Demonstrate the ability to solve engineering problems in processing of plastics

Subject: ELECTRICAL DRIVES AND CONTROL

CO1	After completion of the course, Students are able to, Illustrate the structure and characteristics of basic electronic devices.
CO2	Modeling of amplifiers and oscillators using basic electronic devices.
CO3	Demonstrate oscillators using basic electronic devices.

Subject: MANUFACTURING TECHNOLOGY – I LABORATORY

CO1	After completion of the course, Students are able to, Demonstrate various turning operations.
CO2	Perform thread cutting and boring operations
CO3	Prepare sand moulds for various patterns.
CO4	Convert round rod into square and hexagonal shape.
CO5	Demonstrate various welding operations
CO6	Demonstrate various drilling operations.

Subject: COMPUTER AIDED MACHINE DRAWING

CO1	After completion of the course, Students are able to, Follow the drawing standards, Fits and Tolerances.
CO2	Re-create part drawings, sectional views and assembly drawings as per standards

Subject: ELECTRICAL ENGINEERING LABORATORY

CO1	After completion of the course, Students are able to, Validate the principles studied in theory by performing experiments in the laboratory
CO2	Perform speed characteristic of different electrical machine

Subject: INTERPERSONAL SKILLS/LISTENING & SPEAKING

CO1	After completion of the course, Students are able to, Listen and respond appropriately.
CO2	Participate in group discussions
CO3	Make effective presentations
CO4	Participate confidently and appropriately in conversations both formal and informal

SEMESTER-IV

Subject: STATISTICS AND NUMERICAL METHODS

CO1	After completion of the course, Students are able to, Solve algebraic equations and linear systems of equations and also Eigen value problems.
CO2	Construct algebraic polynomials from given data with equal and unequal intervals.
CO3	Evaluate the value of differentiation and integration of a function given by data.
CO4	Solve ODE with initial and final conditions.
CO5	Solve PDE specifically Wave and Heat equations with initial and final conditions.

Subject: KINEMATICS OF MACHINERY

CO1	After completion of the course, Students are able to, Understand the basic concepts in mechanisms of machines and its applications.
CO2	Analyse displacement, velocity and acceleration in simple mechanism.
CO3	Differentiate and draw CAM profile for engineering applications.
CO4	Perform kinematic analysis of gears and gear trains.
CO5	Examine friction in various machine elements.

Subject: MANUFACTURING TECHNOLOGY-II

CO1	After completion of the course, Students are able to, Describe the mechanism of chip formation in machining.
CO2	Demonstrate the constructional features and operations of turning machine.
CO3	Explain the various operations like shaping, milling and gear manufacturing.
CO4	Understand the principle of various abrasive processes.
CO5	Demonstrate the programming in CNC machines

Subject: ENGINEERING METALLURGY

CO1	After completion of the course, Students are able to, Understand the formation of Materials and its Classification based on atomic arrangement.
CO2	Classify various types of heat treatment methods
CO3	Categorize various types of ferrous and non ferrous metals
CO4	Distinguish the properties and failures of materials
CO5	Evaluate the properties and failures of materials

Subject: STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS

CO1	After completion of the course, Students are able to, Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
CO2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
CO3	Apply basic equation of simple torsion in designing of shafts and helical spring
CO4	Calculate the slope and deflection in beams using different methods.
CO5	Analyze and design thin and thick shells for the applied internal and external pressures.

Subject: THERMAL ENGINEERING-I

CO1	After completion of the course, Students are able to, Explain the basic concept of Thermal systems
CO2	Explain the working principle of IC engines and combustion process.
CO3	Discuss the working principle of air standard cycles and performance of engines
CO4	Estimate the dimensions of steam nozzles and steam turbines for power generation.
CO5	Find the power requirement of reciprocating air compressors.

Subject: MANUFACTURING TECHNOLOGY- II LABORATORY

CO1	After completion of the course, Students are able to, Operate milling machine and perform various milling operations
CO2	Produce components using shaper
CO3	Perform keyway cutting operations using slotter.
CO4	Perform boring, reaming and tapping, cylindrical and surface grinding operations
CO5	Produce bevel gears.
CO6	Perform drilling operations.

Subject: STRENGTH OF MATERIALS AND FLUID MECHANICS AND MACHINERY LABORATORY

CO1	After completion of the course, Students are able to, Perform different destructive testing
CO2	Characterize the material
CO3	Use the measurement equipments for flow measurement.
CO4	Do performances test on pumps.
CO5	To do performance test on turbines.

Subject: ADVANCED READING AND WRITING

CO1	After completion of the course, Students are able to, Write different types of essays.
CO2	Write winning job applications.
CO3	Read and evaluate texts critically.
CO4	Display critical thinking in various professional contexts.

YEAR: III
SEMESTER-V

Subject: THERMAL ENGINEERING- II

CO1	After completion of the course, Students are able to, Solve problems in Steam Nozzle
CO2	Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.
CO3	Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems
CO4	Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers

Subject: DESIGN OF MACHINE ELEMENTS

CO1	After completion of the course, Students are able to, Explain the influence of steady and variable stresses in machine component design.
CO2	Apply the concepts of design to shafts, keys and couplings.
CO3	Apply the concepts of design to temporary and permanent joints.
CO4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
CO5	Apply the concepts of design to bearings.

Subject: METROLOGY AND MEASUREMENTS

CO1	After completion of the course, Students are able to, Work in Quality control and quality assurances divisions in industries
CO2	Explain the basics of standards of measurement, limits, fits & tolerances industrial applications.
CO3	Design a measuring equipments for the measurement of temperature and flow.
CO4	Understand the significance of measurement system, errors, transducers, intermediate modifying and terminating devices
CO5	Comprehend the fundamentals of thermocouple and strain measurement

Subject: DYNAMICS OF MACHINES

CO1	After completion of the course, Students are able to, Explain the basic concept of a Dynamics and predict the force analysis in mechanical system
CO2	Calculate the inertia forces in reciprocating and rotating masses and turning moments in flywheels.
CO3	Balance reciprocating and rotating masses.
CO4	Analyze free natural vibration systems.
CO5	Determine the frequency of damped and forced vibration systems.

Subject: PRODUCTION TECHNOLOGY OF AGRICULTURAL MACHINERY

C01	After completion of the course, Students are able to, Explain the properties of materials
C02	Explain the working of machines.
C03	Explain and analyze the concepts welding
C04	Review the advanced machining process.
C05	Explain the concepts and working of CNC.

Subject: KINEMATICS AND DYNAMICS LABORATORY

C01	After completion of the course, Students are able to, Construct characteristic curve for governor and profile of cam.
C02	Manipulate the gyroscopic couple and moment of inertia for a given application.
C03	Perform static and dynamic balancing of rotating and reciprocating masses.
C04	Measure natural frequency of forced and free vibrations.
C05	Explain the working of simple bar and link mechanisms.
C06	Demonstrate the principles of kinematics and dynamics of machinery.

Subject: THERMAL ENGINEERING LABORATORY

C01	After completion of the course, Students are able to, Perform steady state conduction, free and forced convection experiments.
C02	Conduct radiation heat transfer experiment.
C03	Study the performance of various types of heat exchangers
C04	Study the performance of refrigerator.
C05	Study the performance of air conditioner.
C06	Students will be able to demonstrate the fundamentals of heat and predict the coefficient used in that transfer application and also design refrigeration cycle.

Subject: METROLOGY AND MEASUREMENTS LABORATORY

C01	After completion of the course, Students are able to, Identify various gauges for measurement.
C02	Demonstrate linear and angular measurement using precision instruments.
C03	Apply the load cell to measure the force and torque
C04	Use thermocouple and vibrometer for taking measurement.
C05	Measure pressure and surface roughness
C06	Handle different measurement tools and perform measurements in quality impulsion

SEMESTER-VI

Subject: DESIGN OF TRANSMISSION SYSTEMS

C01	After completion of the course, Students are able to, Select suitable belt, chain drives for given applications.
C02	Design spur and helical gears.
C03	Design bevel and worm gears for power transmission.
C04	Decide the layout and design the gear box.
C05	Design a cam and clutches for desired applications.
C06	Successfully design transmission components used in machines

Subject: COMPUTER AIDED DESIGN AND MANUFACTURING

C01	After completion of the course, Students are able to, Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
C02	Explain the fundamentals of parametric curves, surfaces and Solids
C03	Summarize the different types of Standard systems used in CAD
C04	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
C05	Summarize the different types of techniques used in Cellular Manufacturing and FMS

Subject: HEAT AND MASS TRANSFER

C01	After completion of the course, Students are able to, Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems.
C02	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems.
C03	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems.
C04	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems.
C05	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications.

Subject: FINITE ELEMENT ANALYSIS

C01	After completion of the course, Students are able to, Understand the principles involved in discretization and finite element approach.
C02	Write finite element equation for simple elements.
C03	Apply finite element concepts for solving thermal and solid mechanics problems
C04	Solve problems in finite element method adopted for cylinders and other axisymmetric objects.
C05	Apply finite element concepts for solving curved boundary problems using ISO parametric elements.

Subject: HYDRAULICS AND PNEUMATICS

CO1	After completion of the course, Students are able to, Explain the Fluid power and operation of different types of pumps.
CO2	Summarize the features and functions of Hydraulic motors, actuators and Flow control valves
CO3	Explain the different types of Hydraulic circuits and systems
CO4	Explain the working of different pneumatic circuits and systems
CO5	Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

Subject: CAD/CAM LABORATORY

CO1	After completion of the course, Students are able to, Reproduce the various commands using modeling software
CO2	Describe the assembly module
CO3	Create three dimensional models
CO4	Assemble various machine components like flange coupling and screw jack.
CO5	Prepare CNC part programming and perform manufacturing.
CO6	Understand the CNC control in modern manufacturing system
CO7	Develop 2D and 3D models using modeling softwares.

Subject: DESIGN AND FABRICATION PROJECT

CO1	After completion of the course, Students are able to, Analyze and identify the problems in the mechanical systems.
CO2	Select and apply proper modern tools.
CO3	Find solution for problems.
CO4	Make use of the benefits of team work.
CO5	Develop drawing, bill of materials and analysis procedures.
CO6	Fabricate any components using different manufacturing tools.

YEAR: IV
SEMESTER-VII

Subject: POWER PLANT ENGINEERING

CO1	After completion of the course, Students are able to, Describe layout of various types of power plants and working principle of boilers.
CO2	Understand and explain the components used in steam power plant
CO3	Illustrate the nuclear reactors and hydel power plants
CO4	Discuss the working of diesel and various gas turbine power plants
CO5	Explain the working of renewable power plants and discuss the economics of power plants.
CO6	Understand different types of power analyse and solve energy and economic related issues in power sectors.

Subject: MECHATRONICS

CO1	After completion of the course, Students are able to, Explain mechatronics design process and adaptive control systems
CO2	Explain overview of signal conditioning.
CO3	Discuss the working of various actuators.
CO4	Discuss the architecture of microprocessors.
CO5	Discuss the various case studies in automation.

Subject: UNCONVENTIONAL MACHINING PROCESS

CO1	After completion of the course, Students are able to, Select appropriate advanced materials processes for a given product or component recognizing material, size, precision, and surface quality requirements.
CO2	Discuss the working principles and equipments of ultrasonic machining and abrasive jet machining
CO3	Outline the fundamentals of EDM and wire cut EDM processes
CO4	Understand and explain the working of ECM Processes and solve simple problems.
CO5	Discuss about radiant energy processes.

Subject: PROCESS PLANNING AND COST ESTIMATION

CO1	After completion of the course, Students are able to, Understand the concept of work study and Ergonomics
CO2	Plan the process planning activities and cost optimal process for a manufacturing process.
CO3	Summarize the concept of cost estimation process.
CO4	Solve problems on various type of cost involved in an organization
CO5	Solve problems on work study.

Subject: ROBOTICS

CO1	After completion of the course, Students are able to, Explain the fundamentals of robot
CO2	Know the working of various robot drive systems and end effectors
CO3	Discuss the working principle of various sensors
CO4	Write robot programming
CO5	Understand the implementation of robotics in industries.

Subject: TESTING OF MATERIALS

CO1	After completion of the course, Students are able to, Identify suitable testing technique to inspect industrial component.
CO2	Ability to use the different technique and know its applications and limitations.

Subject: SIMULATION AND ANALYSIS LABORATORY

CO1	After completion of the course, Students are able to, Demonstrate stress analysis of various mechanical components using analysis software.
CO2	Perform modal analysis for 2D component.
CO3	Analyze thermal stresses in a component.
CO4	Simulate mechanical systems using CAD software.
CO5	Simulate flow using CFD software
CO6	Model, analyze and simulate experiments to meet real world system and evaluate the performance.

Subject: MECHATRONICS LABORATORY

CO1	After completion of the course, Students are able to, Simulate Hydraulic, Pneumatic and using software tool.
CO2	Simulate Electro pneumatic circuits using trainer kits.
CO3	Design and test various fluid power circuits.
CO4	Interface stepper motor with 8051micro controller
CO5	Conduct experiments using servo controller and stepper motor.
CO6	Design mechatronics system with the help of Microprocessor, PLC and other electrical and Electronics circuits.

Subject: TECHNICAL SEMINAR

CO1	After completion of the course, Students are able to, Read articles of a general kind in magazines and newspapers.
CO2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.

Subject: PRINCIPLES OF MANAGEMENT

CO1 to CO5	After completion of the course, Students are able to, have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management
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Subject: PROJECT WORK

CO	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.
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