A.G.Patil Institute of Technology, Solapur

Department of Mechanical Engineering

Program Educational Objectives

PEO 1	Graduates should excel in engineering positions in industry and other organizations that emphasize design and implementation of engineering systems and devices.
PEO 2	Graduates should excel in best post-graduate engineering institutes, acquiring advanced degrees in engineering and related disciplines.
PEO 3	Alumni should establish a successful career in an engineering-related field and adapt to changing technologies.
PEO 4	Graduates are expected to continue personal development through professional study and self-learning.
PEO 5	Graduates should be good citizens and cultured human beings, with full appreciation of the importance of professional, ethical and societal responsibilities.

Program Outcomes

At the end of the program the student will be able to:

PO 1	Apply the knowledge of mathematics, basic sciences, and mechanical engineering to the solution of complex engineering problems.
PO 2	Identify, formulate, research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions.
PO 3	Design solutions for complex engineering problems and design mechanical system components that meet the specified needs.
PO 4	Use mechanical engineering research-based knowledge related to interpretation of data and provide valid conclusions.
PO 5	Create, select, and apply modern mechanical engineering and IT tools to complex engineering activities with an understanding of the limitations.
PO 6	Apply reasoning acquired by the mechanical engineering knowledge to assess societal and safety issues.
PO 7	Understand the impact of engineering solutions on the environment, and demonstrate the knowledge for sustainable development.
PO 8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communicate effectively on complex engineering activities with the engineering community and with society at large.
PO 11	Understand the engineering and management principles and apply these to the multidisciplinary environments.
PO 12	Recognize the need for life-long learning in the broadest context of technological change.

Program-Specific Outcomes (PSOs)

PSO 1	Make the students employable in engineering industries.
PSO 2	Motivate the students for higher studies and research.

Semester III

Material Science and Metallurgy

CO1	Study various crystal structures of materials
CO2	Understand mechanical properties of materials and calculations of same using appropriate equations
CO3	Evaluate phase diagrams of various materials
CO4	Suggest appropriate heat treatment process for a given application
CO5	Prepare samples of different materials for metallography
CO6	Recommend appropriate NDT technique for a given application

Fluid Mechanics

CO1	Define fluid, define and calculate various properties of fluid
CO2	Calculate hydrostatic forces on the plane and curved surfaces and explain stability of floating bodies
CO3	Explain various types of flow. Calculate acceleration of fluid particles
CO4	Apply Bernoulli's equation and Navier-Stokes equation to simple problems in fluid mechanics
CO5	Explain laminar and turbulent flows on flat plates and through pipes
CO6	Explain and use dimensional analysis to simple problems in fluid mechanics
CO7	Understand boundary layer, drag and lift

Machine Drawing and Computer Aided Drafting

CO1	Interpret the object with the help of given sectional and orthographic views.
CO2	Construct the curve of intersection of two solids
CO3	Draw machine element using keys, cotter, knuckle, bolted and welded joint
CO4	Assemble details of any given part. i. e. valve, pump , machine tool part etc.
CO5	Represent tolerances and level of surface finish on production drawings
CO6	Understand various creating and editing commands in Auto Cad

Thermodynamics

CO1	Define the terms like system, boundary, properties, equilibrium, work, heat, ideal gas, entropy etc. used in thermodynamics.
CO2	Study different laws of thermodynamics and apply these to simple thermal systems like balloon, piston-cylinder arrangement, compressor, pump, refrigerator, heat exchanger, etc. to study energy balance.
CO3	Study various types of processes like isothermal, adiabatic, etc. considering system with ideal gas and represent them on p-v and T-s planes.
CO4	Apply availability concept to non-flow and steady flow type systems
CO5	Represent phase diagram of pure substance (steam) on different thermodynamic planes like p-v, T-s, h-s, etc. Show various constant property lines on them.

Basic Human Rights

CO1	Understand the history of human rights.
CO2	Learn to respect others caste, religion, region and culture.
CO3	Be aware of their rights as Indian citizen.
CO4	Understand the importance of groups and communities in the society.
CO5	Realize the philosophical and cultural basis and historical perspectives of human rights.
CO6	Make them aware of their responsibilities towards the nation.

Fluid Mechanics Lab

CO1	Understand laminar and Turbulent flow and determine Critical Reynolds number using Reynolds Apparatus
CO2	Verify Bernoulli's theorem
CO3	Determine pressure drop in flow though pipes and pipe fittings
CO4	Verify momentum equation using impact of jet apparatus
CO5	Determine viscosity using viscometer
CO6	Do calibration of pressure gauges, rotameter
CO7	Use manometers for pressure measurement

Machine Drawing and Computer Aided Drafting Lab

CO1	Draw Conventional representation of standard machine components, welds, material etc.
CO2	Draw sectional view of a given machine component.
CO3	Develop Assemble view from details of given component i.e. valve, pump, machine tool part, etc.
CO4	Combine details of given machine component and draw assembled view.
CO5	Use various Auto-Cad commands to draw orthographic projection
CO6	Draw sectional view from pictorial view of given machine component using Auto-Cad

Semester IV

Manufacturing Processes-I

CO1	Identify castings processes, working principles and applications and list various defects in metal casting
CO2	Understand the various metal forming processes, working principles and applications
CO3	Classify the basic joining processes and demonstrate principles of welding, brazing and soldering
CO4	Study center lathe and its operations including plain, taper turning, work holding devices and cutting tool.
CO5	Understand milling machines and operations, cutters and indexing for gear cutting.

CO6	Study shaping, planing and drilling, their types and related tooling's

Theory of Machines- I

CO1	Define basic terminology of kinematics of mechanisms
CO2	Classify planar mechanisms and calculate its degree of freedom
CO3	Perform kinematic analysis of a given mechanism using ICR and RV methods
CO4	Perform kinematic analysis of a given mechanism analytically using vector or complex algebra method
CO5	Perform kinematic analysis of slider crank mechanism using Klein's construction and analytical approach
CO6	Study shaping, planing and drilling, their types and related tooling's

Strength of Materials

CO1	State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ, etc.
CO2	Recognize the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed in the component in axial/eccentric static and impact load cases
CO3	Distinguish between uniaxial and multiaxial stress situation and calculate principal stresses, max. shear stress, their planes and max. normal and shear stresses on a given plane.
CO4	Analyze given beam for calculations of SF and BM
CO5	Calculate slope and deflection at a point on cantilever /simply supported

	beam using double integration, Macaulay's , Area-moment and superposition methods
CO6	Differentiate between beam and column and calculate critical load for a column using Euler's and Rankine's formulae

Numerical Methods in Mechanical Engineering

CO1	Describe the concept of error
CO2	Illustrate the concept of various Numerical Techniques
CO3	Evaluate the given Engineering problem using the suitable Numerical Technique
CO4	Develop the computer programming based on the Numerical Techniques

Physics of Engineering Materials

CO1	Understand the different types of structures of solid, defects in solids and analysis of crystal structure by X-ray diffraction technique
CO2	Understand the origin and types of magnetism, significance of hysteresis

	loo in different magnetic materials and their uses in modern technology
CO3	Understand the band structure of solids and conductivity, categorization of solids on the basis of band structure, significance of Fermi-Dirac probability functions
CO4	Understand the principles of superconductivity, their uses in modern technology
CO5	Understand the position of Fermi level in intrinsic and extrinsic semiconductors, Semiconductor conductivity
CO6	Understand the electric field in dielectric
CO7	Understand basics of Nano materials, synthesis methods and characterization techniques

Advanced Engineering Chemistry

CO1	Classify and explain various types of Corrosion and should apply methods to minimize the rate of corrosion.
CO2	Understand and apply the concepts of Photochemical and Thermal reactions
CO3	Understand the basic concepts of Polymers, Polymerization and Moulding techniques; Determine molecular weight of High-Polymers.
CO4	Understand and apply the basic techniques in Chemistry and capable to explain the concepts of Solvent Extraction.
CO5	Understand and apply various types of Spectroscopic, Chromatographic techniques and also able to explain the concepts of Thermo-Gravimetric Analysis (TGA).

hterpersonal Communication Skill & Self Development

CO1	Acquire interpersonal communication skills
CO2	Develop the ability to work independently.
CO3	Develop the qualities like self-discipline, self-criticism and self-management.
CO4	Have the qualities of time management and discipline.
CO5	Present themselves as an inspiration for others
CO6	Develop themselves as good team leaders

Mufacturing Processes Lab-I

CO1	Perform plain turning, step turning, knurling, eccentric turning, chamfering and facing operations on lathe.
CO2	Prepare setup and fabricate composite job using milling, shaping and drilling machine.
CO3	Making spur gears on a milling machine.
CO4	Prepare sand casting setup using split pattern for simple component.
CO5	Perform joining of two plate using TIG/MIG welding.
CO6	Demonstrate cutting of a sheet metal using flame cutting.

Theory of Machines Lab-I

CO1	Perform graphically kinematic analysis of any planar mechanism using ICR and RV methods.
CO2	Perform graphically kinematic analysis of slider crank mechanism using Klein's construction
CO3	Demonstrate use of graphical differentiation method for kinematic analysis of slider crank mechanism or any other planar mechanism with a slider
CO4	Sketch polar diagram for a Hooke's joint.

Semester – V

Heat Transfer

CO1	Explain the laws of heat transfer and deduce the general heat conduction equation and to explain it for 1-D steady state heat transfer in regular shape bodies
CO2	Describe the critical radius of insulation, overall heat transfer coefficient, thermal conductivity and lumped heat transfer
CO3	Interpret the extended surfaces
CO4	Illustrate the boundary layer concept, dimensional analysis, forced and free convection under different conditions
CO5	Describe the Boiling heat transfer, mass transfer and Evaluate the heat exchanger and examine the LMTD and NTU methods applied to engineering problems
CO6	Explain the thermal radiation black body, emissivity and reflectivity and evaluation of view factor and radiation shields

Applied Thermodynamics – I

CO1	Define the terms like calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc. Calculate minimum air required for combustion of fuel.
CO2	Study and Analyze gas power cycles and vapour power cycles like Otto, Diesel, dual, Joule and Rankine cycles and derive expressions for the performance parameters like thermal efficiency, Pm
CO3	Classify various types of boiler, nozzle, steam turbine and condenser used in steam power plant.
CO4	Classify various types of IC engines. Sketch the cut section of typical diesel engine and label its components. Define the terms like TDC, BDC, rc, etc
CO5	Draw P-v diagram for single-stage reciprocating air compressor, with and without clearance volume, and evaluate its performance. Differentiate between reciprocating and rotary air compressors

Machine Design – I

CO1	Formulate the problem by identifying customer need and convert into design specification
CO2	Understand component behavior subjected to loads and identify failure criteria

CO3	Analyze the stresses and strain induced in the component
CO4	Design of machine component using theories of failures
CO5	Design of component for finite life and infinite life when subjected to fluctuating load
CO6	Design of components like shaft, key, coupling, screw and spring

Theory of Machines – II

CO1	Identify and select type of belt and rope drive for a particular application
CO2	Evaluate gear tooth geometry and select appropriate gears, gear trains
CO3	Define governor and select/suggest an appropriate governor
CO4	Characterize flywheels as per engine requirement
CO5	Understand gyroscopic effects in ships, aeroplanes, and road vehicles.
CO6	Understand free and forced vibrations of single degree freedom systems

Metrology and Quality Control

CO1	Identify techniques to minimize the errors in measurement
CO2	Identify methods and devices for measurement of length, angle, and gear and thread parameters, surface roughness and geometric features of parts.
CO3	Choose limits for plug and ring gauges.
CO4	Explain methods of measurement in modern machineries
CO5	Select quality control techniques and its applications
CO6	Plot quality control charts and suggest measures to improve the quality of product and reduce cost using Statistical tools.

Automobile Engineering

CO1	Identify the different parts of the automobile.
CO2	Explain the working of various parts like engine, transmission, clutch, brakes etc.,
CO3	Demonstrate various types of drive systems.
CO4	Apply vehicle troubleshooting and maintenance procedures.
CO5	Analyze the environmental implications of automobile emissions. And suggest suitable regulatory modifications.
CO6	Evaluate future developments in the automobile technology.

Nanotechnology

CO1	Demonstrate the understanding of length scales concepts, nanostructures and nanotechnology.
CO2	To impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
CO3	To educate students about the interactions at molecular scale
CO4	Evaluate and analyze the mechanical properties of bulk nanostructured metals and alloys, Nano-composites and carbon nanotubes.
CO5	To make the students understand about the effects of using nanoparticles over conventional methods

Energy Conservation and Management

CO1	Understand energy problem and need of energy management
CO2	Carry out energy audit of simple units
CO3	Study various financial appraisal methods
CO4	Analyse cogeneration and waste heat recovery systems
CO5	Do simple calculations regarding thermal insulation and electrical energy conservation

Heat Transfer Lab

CO1	Understand the various heat transfer mode of heat transfer and its application and verify.
CO2	Learn the experimental methodology
CO3	Describe the concept the terms like least count, calibration of the instruments

Applied Thermodynamics Lab

CO1	Conduct test on Bomb calorimeter, nozzle, steam turbine, condenser, compressor etc. to study their performance.
CO2	Draw performance curves of these machines.
CO3	Analyze the results obtained from the tests.
CO4	Draw conclusions based on the results of the experiments
CO5	Based on your visit to Industry, sketch its layout and write specifications.

Machine Design Practice – I

CO1	Apply design process to an open ended problem
CO2	Determine suitable material and size for structural component of machine/system
CO3	Apply iterative technique in design including making estimate of unknown values for first computation and checking or revisiting and re-computing
CO4	Choose logically and defend selection of design factors
CO5	Design of components for given part/system i.e. shaft, keys, coupling, links, screws, springs etc.
CO6	Work effectively as a part of design group/team
CO7	Have good communication skill, orally, graphically as well as in writing

Theory of Machines Lab – II

CO1	Explain various types of gear boxes, gear trains, belt and rope drives
CO2	Interpreting physical principles and phenomenon of governor, gyroscopic, flywheel
CO3	Measure vibration parameters in single degree of freedom systems
CO4	Evaluating natural frequency of 1 dof

Field Training/Internship/Industrial Training – II

CO1	To make the students aware of industrial culture and organizational setup
CO2	To create awareness about technical report writing among the student.

Semester – VI

Manufacturing Processes – II

CO1	Understand the process of powder metallurgy and its applications
CO2	Calculate the cutting forces in orthogonal and oblique cutting
CO3	Evaluate the machinability of materials
CO4	Understand the abrasive processes
CO5	Explain the different precision machining processes
CO6	Design jigs and fixtures for given application

Machine Design – II

CO1	Define function of bearing and classify bearings.
CO2	Understanding failure of bearing and their influence on its selection.
CO3	Classify the friction clutches and brakes and decide the torque capacity and friction disk parameter.
CO4	Select materials and configuration for machine element like gears, belts and chain.
CO5	Design of elements like gears, belts and chain for given power rating
CO6	Design thickness of pressure vessel using thick and thin criteria

Engineering Tribology

CO1	Understand the basic concepts and importance of tribology.
CO2	Evaluatethenatureofengineeringsurfaces,theirtopographyandsurface characterization techniques
CO3	Analyze the basic theories of friction and frictional behavior of various materials
CO4	Select a suitable lubricant for a specific application
CO5	Compare different wear mechanisms
CO6	Suggest suitable material combination for tribological design.

Additive Manufacturing

CO1	Understand the importance of Additive Manufacturing
CO2	Classify the different AM processes
CO3	Design for AM processes
CO4	Understand the applications of AM
CO5	Differentiate the post processing processes

Mechanical Measurements

CO1	Define measurement parameters, and Identify errors in measurement
CO2	Identify methods and devices for measurement of length, angle
CO3	Identify methods and devices for measurement of pressure, flow, force, torque, strain, velocity, displacement, acceleration, temperature

Quantitative Techniques in Project Management

CO1	Define and formulate research models to solve real life problems for allocating limited resources by linear programming.

CO2	Apply transportation and assignment models to real life situations.
CO3	Apply queuing theory for performance evaluation of engineering and management systems.
CO4	Apply the mathematical tool for decision making regarding replacement of items in real life.
CO5	Determine the EOQ, ROP and safety stock for different inventory models.
CO6	Construct a project network and apply CPM and PERT method.

Sustainable Development

CO1	Explain the difference between development and sustainable development
CO2	Explain challenges of sustainable development and climate change
CO3	Explain sustainable development indicators
CO4	Analyze sustainable energy options
CO5	Understand social and economic aspects of sustainable development

Renewable Energy Sources

CO1	Explain the difference between renewable and non-renewable energy
CO2	Describe working of solar collectors
CO3	Explain various applications of solar energy
CO4	Describe working of other renewable energies such as wind, biomass

Biology for Engineers

CO1	Explain origin of life and Evolution, Cells, Biomolecules-Lipids
CO2	Understand Biomolecules
CO3	Understand Cell structure and function and cell cycle
CO4	Explain Mendelian genetics
CO5	Understand and Explain DNA structure, DNA replication, Transcription, Translation

Solar Energy

CO1	Describe measurement of direct, diffuse and global solar radiations falling on horizontal and inclined surfaces.
CO2	Analyze the performance of flat plate collector, air heater and concentrating type collector.
CO3	Understand test procedures and apply these while testing different types of collectors.
CO4	Study and compare various types of thermal energy storage systems.
CO5	Analyze payback period and annual solar savings due to replacement of conventional systems.
CO6	Design solar water heating system for a few domestic and commercial applications.

Human Resource Management

CO1	Describe trends in the labor force composition and how they impact human resource management practice.
CO2	Discuss how to strategically plan for the human resources needed to meet organizational goals and objectives.

CO3	Define the process of job analysis and discuss its importance as a foundation for human resource management practice
CO4	Explain how legislation impacts human resource management practice.
CO5	Compare and contrast methods used for selection and placement of human resources.
CO6	Describe the steps required to develop and evaluate an employee training program
CO7	Summarize the activities involved in evaluating and managing employee performance
CO8	Identify and explain the issues involved in establishing compensation systems.

Metrology and Quality Control Lab

CO1	Measure linear, angular circular features, dimensional and geometric features
CO2	Measure surface roughness of components
CO3	Calibration of metrological equipment

Machine Design Practice – II

CO1	Apply design process to an open ended problems
CO2	Determine suitable material and size for structural component of machine/system
CO3	Apply iterative technique in design including making estimate of unknown values for first computation and checking or revisiting and re-computing
CO4	Choose logically and defend selection of design factors
CO5	Design of components for given part/system i.e shaft, keys, coupling, links, screws, springs etc.
CO6	Work effectively as a part of design group/team
CO7	Have good communication skill, orally, graphically as well as in writing

IC Engine Lab

CO1	Conduct test on IC Engines to study their performance.
CO2	Draw performance curves of these machines/systems.
CO3	Analyse the results obtained from the tests.
CO4	Draw conclusions based on the results of the experiments

Refrigeration and Air Conditioning Lab

CO1	Conduct test on Refrigeration and air conditioning test units to study their performance.
CO2	Draw performance curves of these machines/systems.
CO3	Analyse the results obtained from the tests.
CO4	Draw conclusions based on the results of the experiments

Technical Project for Community Services

CO1	Visit nearby places to understand the problems of the community
CO2	Select one of the problems for the study, state the exact title of the project and define scope of the problem
CO3	Explain the motivation, objectives and scope of the project

CO4	Evaluate possible solutions of the problem
CO5	Design, produce, test and analyze the performance of product/system/process
CO6	Modify, improve the product/system/process

Semester - VII

Mechatronics

CO1	Define sensor, transducer and understand the applications of different sensors and transducers
CO2	Explain the signal conditioning and data representation techniques
CO3	Design pneumatic and hydraulic circuits for a given application
CO4	Write a PLC program using Ladder logic for a given application
CO5	Understand applications of microprocessor and micro controller
CO6	Analyse PI, PD and PID controllers for a given application

CAD/CAM

CO1	List and describe the various input and output devices for a CAD work station
CO2	Carry out/calculate the 2-D and 3-D transformation positions (Solve problems on 2-Dand 3-D transformations)
CO3	Describe various CAD modeling techniques with their relative advantages and limitations
CO4	Describe various CAD modeling techniques with their relative advantages and limitations
CO5	Develop NC part program for the given component, and robotic tasks
CO6	Describe the basic Finite Element procedure
CO7	Explain various components of a typical FMS system, Robotics, and CIM
CO8	Classify parts in part families for GT
CO9	Describe and differentiate the CAPP systems

Manufacturing Processes – III

CO1	Differentiate clearly between NC and CNC machines
CO2	Prepare and execute a part program for producing a given product
CO3	Select appropriate non-traditional machining process for a given applicatio
CO4	Compare different surface coating techniques
CO5	Explain different rapid prototyping techniques
CO6	Illustrate the working principle of various micro-manufacturing processes

Fluid Machinery

CO1	Understand and apply momentum equation
CO2	Understand and explain Hydrodynamic Machines
CO3	Explain difference between impulse and reaction turbines
CO4	Find efficiencies, draw velocity triangles
CO5	Explain governing mechanisms for hydraulic turbines

CO6	Explain working of various types of pumps, draw velocity diagrams, do simple calculations
CO7	Design simple pumping systems

Industrial Engineering and Management

CO1	Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering
CO2	Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
CO3	Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society.
CO4	Understand their role as engineers and their impact to society at the national and global context

Finite Element Method

CO1	Understand the basic principle of Finite element methods and its applications
CO2	Use matrix algebra and mathematical techniques in FEA
CO3	Identify mathematical model for solution of common engineering problem
CO4	Solve structural , thermal problems using FEA
CO5	Derive the element stiffness matrix using different methods by applying basic mechanics laws
CO6	Understand formulation for two and three dimensional problems

Surface Engineering

CO1	Learn the importance and need of surface engineering
CO2	Describe various surface cleaning and modification techniques
CO3	Understand the concepts of surface integrity
CO4	Compare various surface coating technologies
CO5	Select appropriate method of coating for a given application
CO6	Apply measurement techniques and carry out characterization of coated surfaces.

Engineering Economics

CO1	Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, Benefit-cost ratio.
CO2	Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.
CO3	Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
CO4	Compute the depreciation of an asset using standard Depreciation techniques to assess its impact on present or future value.
CO5	Apply all mathematical approach models covered in solving engineering

	economics problems: mathematical formulas, interest factors from tables, Excel functions and graphs. Estimate reasonableness of the results.
CO6	Examine and evaluate probabilistic risk assessment methods.
CO7	Compare the differences in economic analysis between the private and public sectors. Recognize the limits of mathematical models for factors hard to quantify.
CO8	Develop and demonstrate teamwork, project management, and professional communications skills

Intellectual Property Rights

CO1	State the basic fundamental terms such as copyrights, Patents, Trademarks etc.,
CO2	Interpret Laws of copy-rights, Patents, Trademarks and various IP registration Processes.
CO3	Exhibit the enhance capability to do economic analysis of IP rights, technology and innovation related policy issues and firms commercial strategies.
CO4	Create awareness at all levels (research and innovation) to develop patentable technologies.
CO5	Apply trade mark law, copy right law, patent law and also carry out intellectual property audits
CO6	Manage and safeguard the intellectual property and protect it against unauthorized use.

Wind Energy

CO1	Understand historical applications of wind energy
CO2	Understand and explain wind measurements and wind data
CO3	Determine Wind Turbine Power, Energy and Torque
CO4	Understand and explain Wind Turbine Connected to the Electrical Network AC and DC
CO5	Understand economics of wind energy

Knowledge Management

CO1	Define KM, learning organizations, intellectual capital and related terminologies in clear terms and understand the role of knowledge management in organizations
CO2	Demonstrate an understanding of the history, concepts, and the antecedents of management of knowledge and describe several successful knowledge management systems
CO3	Identify and select tools and techniques of KM for the stages of creation, acquisition, transfer and management of knowledge.
CO4	Analyze and evaluate tangible and intangible knowledge assets and understand current KM issues and initiatives.
CO5	Evaluate the impact of technology including telecommunications, networks, and internet/intranet role in managing knowledge.
CO6	Identify KM in specific environments: managerial and decision making communities; finance and economic sectors; legal information systems;

	health information systems

Mechatronics Lab

CO1	Understand the various types of sensors and their applications
CO2	Design a pneumatic circuit for a given application
CO3	Design a hydraulic circuit for a given application
CO4	Write a PLC program using Ladder logic
CO5	Experiment PID controller for controlling temperature
CO6	Demonstrate the capacitance sensor for measuring level

CAD/CAM Lab

CO1	Construct CAD part models, assembly model and drafting of machine elements using CAD software
CO2	Evaluate stresses in components subjected to simple structural loading using FE software
CO3	Write NC programs for turning and milling
CO4	Describe case study of industrial robots

Seminar

CO1	State the exact title of the seminar
CO2	Explain the motivation for selecting the seminar topic and its scope
CO3	Search pertinent literature and information on the topic
CO4	Critically review the literature and information collected
CO5	Demonstrate effective written and verbal communication

Field Training/Internship/Industrial Training – III

CO1	To make the students aware of industrial culture and organizational setup
CO2	To create awareness about technical report writing among the student.

Project Stage – I

CO1	State the exact title of the project and problem definition
CO2	Explain the motivation, objectives and scope of the project
CO3	Review the literature related to the selected topic of the project
CO4	Design the mechanism, components of the system and prepare detailed drawings.
CO5	Evaluate the cost considering different materials/manufacturing processes

Semester - VIII
Project Stage – II/Internship and Project

CO1	State the aim and objectives for this stage of the project
CO2	Construct and conduct the tests on the system/product
CO3	Analyze the results of the tests
CO4	Discuss the findings, draw conclusions, and modify the system/product, if necessary.

Department of Electronics & Telecommunication Engineering

Program Educational Objectives

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Program Specific Outcomes

PSO 1	Make the students employable in engineering industries.
PSO 2	Motivate the students for higher studies and research.

Program Outcomes

At the end of the program, students will be able to:

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Semester - III

Analog Circuits

CO1	To understand characteristics of IC and Op-Amp and identify the internal structure.
CO2	To introduce various manufacturing techniques.
CO3	To study various op-amp parameters and their significance for Op-Amp.
CO4	To learn frequency response, transient response and frequency compensation techniques for Op-Amp.
CO5	To analyze and identify linear and nonlinear applications of Op-Amp.
CO6	To understand functionalities of PLL.

Electronic Devices & Circuits

CO1	To introduce semiconductor devices FET and MOSFET, their characteristics, operations, circuits and applications
CO2	To introduce concepts of both positive and negative feedback in electronic circuits
CO3	To analyze and interpret FET and MOSFET circuits for small signal at low and high frequencies
CO4	To simulate electronics circuits using computer simulation software and verify desired results

CO5	To study the different types of voltage regulators.

Network Analysis

CO1	To learn about the basic laws of electric circuits as well as the key fundamentals of the communication channels, namely transmission lines.
CO2	To understand the need of simplification techniques of complicated circuits
CO3	To learn about the comprehensive insight into the principle techniques available for characterizing circuits, networks and their implementation in practice.
CO4	To learn about the use of mathematics, need of different transforms and usefulness of differential equations for analysis of networks.
CO5	To train the students for handling analog filter design through theory of NA along with practical, this is basic requirement of signal processing field
CO6	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.

Digital Logic Design

CO1	To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables..
CO2	To lay the foundation for further studies in areas such as communication, VHDL, computer.

Basic Human Rights

CO1	Understand the history of human rights.
CO2	Learn to respect others caste, religion, region and culture.
CO3	Be aware of their rights as Indian citizen.

CO4	Understand the importance of groups and communities in the society.
CO5	Realize the philosophical and cultural basis and historical perspectives of human rights.
CO6	Make them aware of their responsibilities towards the nation.

Electronic Workshop Lab

CO1	To introduce electronic components, devices and its applications
CO2	simple electronic circuits
CO3	To analyze circuits for low and high frequencies

CO4	To simulate electronics circuits using computer simulation software and verify desired results
CO5	To study the different types of voltage regulators.

Semester IV

Electrical Machines and Instruments

CO1	Model and Analyze the performance of different types of DC machines
CO2	Learn the applications of DC generators
CO3	Analyze the performance of different types of DC motors
CO4	Analyze the performance of different types of Sensors and Transducers
CO5	Familiarize with the applications of DC machines
CO6	To prepare students to perform the analysis of any electromechanical system.
CO7	To empower students to understand the working of electrical equipment used in everyday life.

Analog Communication Engineering

CO1	To introduce the concepts of analog communication systems.
CO2	To equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.
CO3	To understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase)

Microprocessor

CO1	Objective of this course is to introduce to the students the fundamentals of microprocessor
CO2	After learning Microprocessor course, students will get advantage to pursue higher studies in Embedded Systems or employment in core industries.
CO3	The learner can design microprocessor based systems and thus can become successful entrepreneur and meet needs of Indian and multinational industries.
CO4	The students can design and develop processor which can be used in Robotics, Automobiles, Space and many research areas.
CO5	The learners will acquaint optimization skills and undergo concepts design metrics for embedded systems.
CO6	The students will get acquainted with recent trends in microprocessor like pipelining, cache memory etc.
CO7	To understand the applications of Microprocessors.

CO8	To learn interfacing of real world input and output devices.
CO9	To study various hardware and software tools for developing applications.

Signals and Systems

CO1	To understand the mathematical description of continuous and discrete time signals and systems
CO2	To classify signals into different categories.
CO3	To analyze Linear Time Invariant (LTI) systems in time and transform domains.
CO4	To build basics for understanding of courses such as signal processing, control system and communication
CO5	To develop basis of probability and random variables.

Product Design Engineering

CO1	Create simple mechanical or other designs
CO2	Create design documents for knowledge sharing
CO3	Manage own work to meet design requirements
CO4	Work effectively with colleagues.

Numerical Methods and Computer Programming

CO1	To prepare students for successful career in industries, for Post Graduate programmes and to work in research institutes.
CO2	To understand different numerical techniques used for solving algebraic and transcendental equations.
CO3	To understand numerical methods to solve a system of linear equations.
CO4	To understand numerical integration and differentiation techniques
CO5	To understand various difference operators and interpolation techniques
CO6	To understand object-oriented programming fundamentals and features
CO7	To mold students professionally by course contents and sufficient problem solving and programming exercises and to acquaint them with different types of numerical techniques and programming concepts.

Semester – V

Electromagnetic Field Theory

CO1	Learners can be able to explore their knowledge in the area of EM Waves and its analysis
CO2	To learn basic coordinate system, significance of divergence, gradient, curl and its

	applications to EM Waves.
CO3	To understand the boundary conditions for different materials /surfaces
CO4	To get insight on finding solution for non-regular geometrical bodies using Finite Element Method, Method of Moments, Finite Difference Time Domain
CO5	To get the basics of microwave, transmission lines and antenna parameters.
CO6	Students get acquainted with different physical laws and theorems and provide basic platform for upcoming communication technologies

Control System Engineering

CO1	To introduce the elements of control system and their modeling using various Techniques
CO2	To introduce methods for analyzing the time response, the frequency response and the stability of systems.
CO3	To introduce the concept of root locus, Bode plots, Nyquist plots.
CO4	To introduce the state variable analysis method.
CO5	To introduce concepts of PID controllers and digital and control systems.
CO6	To introduce concepts programmable logic controller.

Computer Architecture

CO1	To introduce basic concepts of computer organization and to illustrate the computer organization concepts by Assembly Language programming.
CO2	To understand operating systems and how they work with the computer and students will understand the relationship between hardware and software specifically how machine organization impacts the efficiency of applications written in a high-level language.
CO3	Students will be able to make use of the binary number system to translate values between the binary and decimal number systems, to perform basic arithmetic operations and to construct machine code instructions and students will be able to design and implement solutions for basic programs using assembly language.
CO4	Students will be able to design logical expressions and corresponding integrated logic circuits for a variety of problems including the basic components of a CPU such as adders, multiplexers, the ALU, a register file, and memory cells and to explain the fetch execute cycle performed by the CPU and how the various components of the data path are used in this process.

Digital Signal Processing

CO1	To introduce students with transforms for analysis of discrete time signals and systems.
CO2	To understand the digital signal processing, sampling and aliasing.
CO3	To use and understand implementation of digital filters
CO4	To understand concept of sampling rate conversion and DSP processor architecture.

Microcontroller and its Applications

CO1	Objective of this course is to introduce to the students the fundamentals of microcontroller.
CO2	After learning Microprocessor course, students will get advantage to pursue higher studies in Embedded Systems or employment in core industries.
CO3	The learner can microcontroller design based systems and thus can become successful entrepreneur and meet needs of Indian and multinational industries.
CO4	The students can design and develop processor which can be used in Robotics, Automobiles, Space and many research areas.
CO5	The learners will acquaint optimization skills and undergo concepts design metrics for embedded systems.
CO6	The students will get acquainted with recent trends in microcontroller like pipelining, cache memory etc.
CO7	To understand the applications of Microcontrollers.
CO8	To understand need of microcontrollers in embedded system.
CO9	To understand architecture and features of typical Microcontroller.
CO10	To learn interfacing of real world input and output devices.
CO11	To study various hardware and software tools for developing applications.

Data Structure & Algorithms Using Java Programming

CO1	To assess how the choice of data structures and algorithm design methods impacts the performance of programs.
CO2	To choose the appropriate data structure and algorithm design method for a specified application.
CO3	To study the systematic way of solving problems, various methods of organizing large amounts of data.
CO4	To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solution
CO5	To employ the different data structures to find the solutions for specific

	problems
CO6	To impart the basic concepts of data structures and algorithms.

Mini Project

CO1	State the exact title of the project and problem definition
CO2	Explain the motivation, objectives and scope of the project
CO3	Review the literature related to the selected topic of the project
CO4	Design the mechanism, components of the system and prepare detailed drawings.
CO5	Evaluate the cost considering different materials/manufacturing processes
CO6	Construct and conduct the tests on the system/product
CO7	Analyze the results of the tests
CO8	Discuss the findings, draw conclusions, and modify the system/product, if necessary

Seminar

CO1	State the exact title of the seminar
CO2	Explain the motivation for selecting the seminar topic and itsscope .
CO3	Search pertinent literature and information on the topic
CO4	Critically review the literature and information collected
CO5	Demonstrate effective written and verbal communication

Field Training/Internship/Industrial Training

CO1	To make the students aware of industrial culture and organizational setup
CO2	To create awareness about technical report writing among the student.

Semester – VI

Antennas and Wave Propagation

CO1	To understand the applications of electromagnetic engineering.
CO2	To formulate and solve the Helmholtz wave equation and solve it for Uniform Plane Wave
CO3	To analyze and understand the Uniform plane wave propagation in various media.

CO4	To solve the electric field and magnetic fields for a given wire antenna.

Computer Network & Cloud Computing

CO1	To develop an understanding of modern network architectures from a design and performance perspective.
CO2	To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
CO3	To provide an opportunity to do network programming
CO4	To provide a WLAN measurement ideas.

Digital Image Processing

CO1	An ability to use current techniques, skills, and tools necessary for computing practice with an understanding of the limitations

Power Electronics

CO1	To introduce students to different power devices to study their construction, characteristics and turning on circuits.
CO2	To give an exposure to students of working & analysis of controlled rectifiers for different loads, inverters, DC choppers, AC voltage controllers and resonant converters.
CO3	To study the different motor drives, various power electronics applications like UPS, SMPS, etc. and some protection circuits.

Python Programming

CO1	Provide an understanding of the role computation can play in solving problems.
CO2	Help students, including those who do not plan to major in Computer Science and Electrical Engineering, feel confident of their ability to write small programs that allow them to accomplish useful goals.
CO3	Position students so that they can compete for research projects and excel in subjects with programming components

Employability & Skill Development

CO1	To develop analytical abilities.

CO2	To develop communication skills.
CO3	To introduce the students to skills necessary for getting, keeping and being successful in a profession.

Semister-VII

Digital Communication

CO1	To understand the building blocks of digital communication system.
CO2	To prepare mathematical background for communication signal analysis
CO3	To understand and analyze the signal flow in a digital communication system.
CO4	To analyze error performance of a digital communication system in presence of noise and other interferences.
CO5	To understand concept of spread spectrum communication system.

Satellite Communication

CO1	To provide students with good depth of knowledge in radar and Satellite communication.
CO2	Knowledge of theory and practice of advanced communication techniques e.g. TDMA, CDMA, FDMA.
CO3	This will equip the students for further studies and research knowledge of modern applications in radar and Satellite communication.

Artificial Intelligence Deep Learning

CO1	Apply AI techniques to solve the given problems.
CO2	Implement trivial AI techniques on relatively large system
CO3	Explain uncertainty and Problem solving techniques.
CO4	Compare various learning techniques

Mechatronics

CO1	Understand key elements of Mechatronics system, representation into block diagram.
CO2	Understand concept of transfer function, reduction and analysis.
CO3	Understand principles of sensors, its characteristics, interfacing with DAQ

	microcontroller.
CO4	Understand the concept of PLC system and its ladder programming, and significance of PLC systems in industrial application.
CO5	Understand the system modelling and analysis in time domain and frequency domain
CO6	Understand control actions such as Proportional, derivative and integral and study its significance in industrial applications.
CO7	Interfacing of Sensors, Actuators using appropriate DAQ micro-controller.

Field Training/Internship/Industrial Training

CO1	To make the students aware of industrial culture and organizational setup
CO2	To create awareness about technical report writing among the student.

Project Stage – I

CO1	State the exact title of the project and problem definition
CO2	Explain the motivation, objectives and scope of the project
CO3	Review the literature related to the selected topic of the project
CO4	Design the mechanism, components of the system and prepare detailed drawings.
CO5	Evaluate the cost considering different materials/manufacturing processes

Semester - VIII

Project Stage – II/Internship and Project

CO1	State the aim and objectives for this stage of the project
CO2	Construct and conduct the tests on the system/product
CO3	Analyze the results of the tests
CO4	Discuss the findings, draw conclusions, and modify the system/product, if necessary.