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.

Course Outcomes- Dept. of Mechanical Engineering

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
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

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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.

DEPARTMENT OF CIVIL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

PEO1	Graduates will be prepared with strong engineering fundamentals leading to excellent performance in professional career in planning, designing, construction, operation & maintenance of the built environment and global infrastructure that meet the societal needs.
PEO2	Graduates will exhibit strong technical ability to create & synthesize data using relevant tools and concepts, for providing sustainable solutions to civil engineering problems and projects.
PEO3	Graduates will exhibit excellent interpersonal communication and resource management skills as leaders in the civil engineering profession while working as a part of multidisciplinary team
PEO4	Graduates will be prepared with sound foundation in mathematics, science and in Civil Engineering to prepare them for higher studies and research.
PEO5	Graduates will possess a breadth of knowledge and engage themselves in the life-long learning to meet challenges of globalisation.
PEO6	Graduates will have a sense of responsibility, respect towards society & its heritage and will follow the professional ethics.

PROGRAM OUTCOMES

PO1	Preparation: To prepare students to excel in various educational programmes or to succeed in industry / technical profession through further education/training.
PO2	Core Competence: To provide students with a solid foundation in mathematical, scientific fundamentals required to solve Structural problems.
PO3	Breadth: To train students with a breadth of scientific knowledge to comprehend, analyze, design & create novel products and solutions for real life problems.

PO4	Professionalism: To inculcate in students professional/ethical attitude, effective team work skills, multidisciplinary approach and to relate engineering issues to a broader context.
PO5	Learning Environment: To provide students with academic environment of excellence, leadership, ethical guidelines and life-long learning needed for a long / productive career.
PO6	Taking pride in their profession and have commitment to highest standards of ethical practices and related technical disciplines.
PO7	Able to design structural system that is safe, economical and efficient.
PO8	Capable of using modern tools efficiently in all aspects of professional practices.
PO9	Dealing successfully with real life civil engineering problems and achieve practical solutions based on a sound science and engineering knowledge.
PO10	Shall be engage in continuous research, development and exchange of knowledge for professional development.
PO11	Be honest in their control and performing their duties and promote effective use of resources through open, honest and impartial services to the public.
PO12	Act in such a manner which will uphold the honour, integrity, or dignity of the engineering profession, and avoid knowingly engaging in business or professional practices of a fraudulent, dishonest or unethical nature.
PO13	Recognize that the lives, safety, health and welfare of the general public are dependent upon engineering, decision and practices.
PO14	Continue their professional development throughout their careers and provide opportunities for the professional development.

PROGRAM-SPECIFIC OUTCOMES (PSOS)

PSO1	Make the students employable in engineering industries.
PSO2	Motivate the students for higher studies and research.
PSO3	Motivate the students for various competitive examinations.

Course Outcomes- Dept. of Civil Engineering
Semester – III

BTBSC301 Mathematics – III

CO1	student will be able to formulate and solve mathematical model of civil engineering phenomena in field of structures, survey, fluid mechanics and soil mechanics

BTCVC302 Mechanics of Sol ids

CO1	Perform the stress-strain analysis.
CO2	Draw force distribution diagrams for members and determinate beams.
CO3	Find deflections in determinant beams.
CO4	Visualize force deformation behavior of bodies

BTCVC303 Hydraulics I

CO1	Calibrate the various flow measuring devices.
CO2	Determine the properties of fluid and pressure and their measurement.
CO3	Understand fundamentals of pipe flow, losses in pipe and analysis of pipe network.
CO4	Visualize fluid flow phenomena observed in Civil Engineering systems.

BTCVC304 Surveying – I

CO1	Perform measurements in linear/angular methods..
CO2	Perform plane table surveying in general terrain.
CO3	Know the basics of leveling and theodolite survey in elevation and angular measurements

BTCVC305 Building Construction

CO1	Understand types of masonry structures.
CO2	Understand composition of concrete and effect of various parameters affecting strength.
CO3	Comprehend components of building and there purposes.
CO4	Comprehend the precast and pre-engineered building construction techniques.

BTCVC306 Engineering Geology

CO1	Recognize the different land forms which are formed by various geological agents.
CO2	Identify the origin, texture and structure of various rocks and physical properties of mineral.
CO3	Emphasize distinct geological structures which have influence on the civil engineering structure.
CO4	Understand how the various geological conditions affect the design parameters of structures.

BTCVL308 Surveying Laboratory - I

CO1	Use the theodolite along with chain/tape, compass on the field.
CO2	Apply geometric and trigonometric principles of basic surveying calculations.
CO3	Plan a survey, taking accurate measurements, field booking, and adjustment of errors.
CO4	Apply field procedures in basic types of surveys, as part of a surveying team.
CO5	Employ drawing techniques in the development of a topographic map.

BTCVL309 Building Construction - Drawings Laboratory

CO1	Draw plan, elevation and section of various structures.
CO2	Apply the principles of planning and by laws used for building planning.
CO3	Prepare detailed working drawing for doors and windows.

Semester IV

BTCVC401 Hydraulics II

CO1	Design open channel sections in a most economical way.
CO2	Know about the non-uniform flows in open channel and the characteristics of hydraulic jump.
CO3	Understand application of momentum principle of impact of jets on plane

BTCVC402 Surveying II

CO1	Understand basics different types of curves on roads and their preliminary survey.

CO2	Perform setting of curves, buildings, culverts and tunnels.
CO3	Comprehend different geodetic methods of survey such as triangulation, trigonometric leveling.
CO4	Comprehend modern advanced surveying techniques.

BTCVC403 Structural Mechanics – I

CO1	Describe the concept of structural analysis, degree of indeterminacy.
CO2	Calculate slopes and deflection at various locations for different types of beams.
CO3	Identify determinate and indeterminate trusses and calculate forces in the members of trusses Perform the distribution of the moments the in continuous beam and frame

BTCVC406 Engineering Management

CO1	Demonstrate the nuances of management functions.
CO2	Analyze the framework of a business organization.
CO3	Adopt an empirical approach toward business situations.
CO4	Apply various Management techniques.

BTCVL407 Hydraulic Engineer ing Laboratory II

CO1	Understand various properties of fluids and measurement techniques.
CO2	Carry out calibrations of various flow measuring devices.
CO3	Understand mechanism of hydraulic jump, various jets and pumps

BTCVL408 Surveying Laboratory – II

CO1	Determine contour level of field.
CO2	Determine the tachometric constants and grade of a line.
CO3	Use sub tense bar for distance measurement

BTCVL409 Solid Mechanics Laboratory

CO1	Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.
CO2	Determine the strength of coarse aggregates.
CO3	Find the compressive strength of concrete cubes and bricks.
CO4	Determine physical properties of given coarse aggregates, fine aggregates and cement samples.

Semester – V

BTCVC501 Design of Steel Structures

CO1	Identify and compute the design loads and the stresses developed in the steel member.
CO2	Analyze and design the various connections and identify the potential failure modes.
CO3	Analyze and design various tension, compression and flexural members.
CO4	Understand provisions in relevant BIS Codes.

BTCVC502 Structural Mechanics-II

CO1	Have a basic understanding of matrix method of analysis and will be able to analyze the determinant structure.
CO2	Have a basic understanding of the principles and concepts related to finite difference and finite element methods
CO3	Have a basic understanding of concept of influence line

BTCVC503 Soil Mechanics

CO1	Understand different soil properties and behavior
CO2	Understand stresses in soil and permeability and seepage aspects.
CO3	Develop ability to take up soil design of various foundations.

BTCVC504 Environmental Engineering

CO1	Apply the water treatment concept and methods.

CO2	Prepare basic process designs of water and wastewater treatment plants.
CO3	Apply the wastewater treatment concept and methods.
CO4	Apply the solid waste management concepts.

BTCVC505 Transportation Engineering

CO1	Comprehend various types of transportation systems and their history of the development
CO2	Comprehend to various types of pavements
CO3	Design the pavements by considering various aspects associated with traffic safety measures.

BTCVL508 Soil Mechanics Laboratory

CO1	Determine different engineering properties of soil.
CO2	Identify and classify soils based on standard geotechnical engineering practices.
CO3	Perform Laboratory oratory compaction and in-place density tests.
CO4	Perform and interpret direct shear tests and estimate shear strength parameters.

BTCVL509 Environmental Engineeing Laboratory

CO1	Quantify the pollutant concentration in water, wastewater and ambient air.
CO2	Recommend the degree of treatment required for the water and wastewater.
CO3	Analyze the survival conditions for the microorganism and its growth rate

BTCVL510Transportation Engineering Laboratory

CO1	Perform tests on various road construction materials.
CO2	Perform CBR tests on local soils to determine subgrade properties needed for roadways.

BTCVE506A Materials, Testing &Evaluation

CO1	To develop skill among students to construct strong and durable structures by applying knowledge of material science..
CO2	To make the students aware of quality assurance and control in their real life as a professional

Semester-VI

BTCVC601 Design of Concrete Structures – I

CO1	Comprehend to the various design philosophies used for design of reinforced concrete.
CO2	Analyze and design the reinforced concrete slab using limit state and working state method.
CO3	Analyze and design the reinforced concrete beam using limit state and working state method.
CO4	Analyze and design the reinforced concrete column using limit state and working state method

BTCVC602 Foundation Engineering

CO1	To predict soil behavior under the application of loads and come up with appropriate solutions to foundation design queries.
CO2	Analyze the stability of slope by theoretical and graphical methods.
CO3	Analyze the results of in-situ tests and transform measurements and associated uncertainties into relevant design parameters.
CO4	Synthesize the concepts of allowable stress design, appropriate factors of safety, margin of safety, and reliability.

BTCVC603 Concrete Technology

CO1	Understand the various types and properties of ingredients of concrete.
CO2	Understand effect of admixtures on the behavior of the fresh and hardened concrete.
CO3	Formulate concrete design mix for various grades of concrete.

BTCVC604 Project Management

CO1	Understand various steps in project Management, different types of charts.
CO2	Construct network by using CPM and PERT method.
CO3	Determine the optimum duration of project with the help of various time estimates.
CO4	Know the concept of engineering economics, economic comparisons, and linear break even analysis problems.
CO5	Understand the concept of total quality Management including Juran and Deming's philosophy.

BTCVC606 Building Planning and Design

CO1	To plan buildings considering various principles of planning and bye laws of governing body.

CO2	Comprehend various utility requirements in buildings
CO3	Understand various techniques for good acoustics.

BTCVL608 Building Planning Design and Drawing Laboratory

CO1	Draw plan elevation and section of load bearing and framed structures
CO2	Draw plan elevation and section of public structures.

BTCVE605A Waste Water Treatments

CO1	Determine the sewage characteristics and design various sewage treatment plants.
CO2	Understand municipal water and wastewater treatment system design and operation.
CO3	Apply environmental treatment technologies and design processes for treatment of industrial waste water.
CO4	Understand the rural sanitation schemes.

Semester – VII

BTCVC701 Design of Concrete Structures I I

CO1	Able to identify the behavior, analyze and design of the beam sections subjected to torsion.
CO2	Able to analyze and design of axially and eccentrically loaded column and construct the interaction diagram for them.
CO3	Understand various concepts, systems and losses in pre-stressing.
CO4	Able to analyze and design the rectangular and symmetrical I-section pre-stressed beam/girders.

BTCVC702 Infrastructure Engineering

CO1	Know about the basics and design of various components of railway engineering
CO2	Understand the types and functions of tracks, junctions and railway stations.
CO3	Know about the aircraft characteristics, planning and components of airport
CO4	Understand the types and components of docks and harbors.

BTCVC703 Water Resources Engineering

CO1	Know about the basics and design of various components of railway engineering

CO2	Understand various irrigation structures and schemes
CO3	Develop basis for design of irrigation schemes

BTCVC704 Professional Practices

CO1	Understand the importance of preparing the types of estimates under different conditions for various structures.
CO2	Know about the rate analysis and bill preparations and to study about the specification writing.
CO3	Know the various types of contract, accounts in PWD, methods for initiating the works in PWD and tendering.
CO4	Understand the valuation of land and buildings, various methods and factors affecting valuation

BTCVE802B Construction Techniques

CO1	Understand the planning of new project with site accessibility and services required
CO2	Comprehend the various civil construction equipment's
CO3	Familiar with layout of RMC plant, production, capacity and operation process
CO4	Recognize various aspect of road construction, construction of diaphragm walls, railway track construction etc.

BTCVOE706E Town and Urban Planning

CO1	Understand town and Urban planning and their essential attributes
CO2	Identify elements of planning and regulations of the same
CO3	Implement guidelines provided by standard authorities

BTCVL707 Design Drawing of RC & Steel Structures

CO1	On completion of the course, student will be able to simulate a practical design requirement in to a theoretical statement to solve mathematically to arrive at a safe economical and realistic feasible solution that can be executed.

Department Of Computer Engineering

Program Educational Objectives

Objective Identifier	*Objectives*
PEO1	To provide students good knowledge of Mathematics, Science and Technology as well as the logical base of Computer Science that will be useful in solving complex engineering problems and develop lifelong learning ability.
PEO2	To impart knowledge with good understanding of fundamentals of all subjects of Computer Science & Engineering, so that students are able to analyze, design and implement new projects from various application domains using various modern engineering tools.
PEO3	To develop excellent logical thinking & programming skills to enable students to design, develop system and application level software's within realistic constraints.
PEO4	To make students good human beings who will have sense of social responsibility and respect over society & its heritage by creating good social environment for them as well as teach them professional and ethical standards .
PEO5	To improve communication, presentation, team working skills and managerial skills leading to entrepreneurship and leadership.
PEO6	To introduce students with new technology to meet the challenges of changing scenario in IT Sector and make them aware of contemporary issues at national & international level.

Program Outcomes

Outcome Identifier	Outcomes
PO1	An ability to apply knowledge of mathematics, science, and engineering.
PO2	An ability to design and conduct experiments, as well as to analyze and interpret data.
PO3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
PO4	An ability to function on multidisciplinary teams.
PO5	An ability to identify, formulates, and solves engineering problems.
PO6	An understanding of professional and ethical responsibility.
PO7	An ability to communicate effectively.
PO8	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO9	A recognition of the need for, and an ability to engage in life-long learning. (j) A knowledge of contemporary issues.
PO10	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcomes- Dept. of Computer Engineering

Semester – III

Engineering Mathematics – III

On completion of the course students will be able to	
CO1	Solve higher order linear differential equations using appropriate techniques for modelling and analysing electrical circuits.
CO2	Solve problems related to Fourier transforms, Laplace transforms and applications to communication systems and signal processing.
CO3	Perform vector differentiation and integration, analyse vector fields and apply to electromagnetic fields.
CO4	Analyse conformal mappings, transformations and perform contour integration of complex functions in the study of electro statics and signal processing.

Discrete Mathematics

CO1	Understand sets, relations, functions and discrete structures. Apply Propositionallogic and First order logic to solve problems.
CO2	Express and solve number theoretic problems using algebraic properties of groups,rings and fields.
CO3	To design and develop real time application using graph theory.
CO4	Students would be able to model and analyze computational processes using analyticand combinatorial methods.
CO5	Students will be able to use the methods learnt as part of this subject in subsequentcourses in the design and analysis of algorithms, theory of computation, and compilers.
CO6	Develop a discrete model for a given computational problem and solve.

Data Structures

CO1	Student should able to know fundamentals of data structures like array, list, linkedlist, stack, queue, tree, graph, hashing.
CO2	Student should able to identify suitable data structure for application.
CO3	Student should able to use data structure to solve problems.
CO4	Student should able to implement various data structures and algorithm essential forimplementing computer based solutions.

Computer Architecture & Organization

CO1	To understand the basic hardware and software issues of computer organization.
CO2	Identify functional units, bus structure and addressing modes.
CO3	Students will be able to identify where, when and how enhancements of computerperformance can be accomplished.
CO4	Students will also be introduced to more recent applications of computer organizationin advanced digital systems.
CO5	Identify memory hierarchy and performance.

Object Oriented Programming in Java

CO1	Appreciation and understanding of object oriented concepts and their utility.
CO2	Apply Object oriented approach to design software.
CO3	Ability to formulate the problem, come up with object oriented design.
CO4	Practicing use of different features of Object Oriented Methodology like templates, exception handling, reflection etc.
CO5	Study different systems and apply different design methodologies based on the problem specification and objectives.

Semester – IV

Design & Analysis of Algorithms

CO1	Analyzing the amortized time complexity of a given algorithm and data structure operations.
CO2	Decide the appropriate design methodology for a given problem from among the paradigms of Divide and Conquer, Dynamic Programming, Greedy, Branch and Bound.
CO3	Design algorithms for network flows.
CO4	Distinguish between P and NP classes of problems.

Operating Systems

CO1	Understand functional architecture of an operating system.
CO2	To provide a detailed discussion of the various memory management techniques.
CO3	Learn about and understand theoretical concepts and programming constructs used for the operation of modern operating systems.
CO4	Gain practical experience with software tools available in modern operating systems such as semaphores, system calls, sockets and threads.

Basic Human Rights

CO1	Be familiar with the major universal and regional systems of human rights law, their relationships to each other, and the legal value and authority of declarations, decisions, judgments and other materials generated by them.
CO2	Develop an awareness of the primary areas of concern within the field of human rights law and other relevant branches of law, and the ways in which human rights are promoted and protected.

Probability Theory and Random Processes

CO1	Develop appropriate probabilistic model for a given problem of algorithmic nature and computation of its statistical parameters.
CO2	Learning of different methods of statistics for data analysis.

CO3	Modeling of various real life problems of operation research.
CO4	Determine service time and waiting time in a queue.
CO5	To understand elementary queuing concepts and apply elsewhere in computerscience.

Digital Logic Design & Microprocessors

CO1	To understand the concepts of Architecture of 8086 Microprocessor.
CO2	Ability to write assembly language programs to realize various high level language constructs, considering the architectural features, memory design of the underlying hardware.To realize the issues in computer architecture and organization.
CO3	Ability to interface various programmable devices to the microprocessor and program them to perform data transfer in real life applications.
CO4	Understand concept of interfacing of peripheral devices and their applications.

Semester – V

Database Systems

CO1	Model, design and normalize databases for real life applications.
CO2	To learn data models, conceptualize and depict a database system using ER diagram.
CO3	Query Database applications using Query Languages like SQL.
CO4	Understand validation framework like integrity constraints, triggers and assertions.
CO5	Understand various storage structures and query optimization.

Theory of Computation

CO1	Design finite state machines, regular expressions and grammars for given languages
CO2	Understand formal machines, languages and computations
CO3	Develop analytical thinking and intuition for problem solving situations in relatedareas of theory of computation.
CO4	To know the limitations of computation, i.e. the unsolvability of problems.
CO5	

Software Engineering

CO1	To understand the Software Engineering Practice & Process Models.
CO2	To understand Design Engineering, Web applications, and Software ProjectManagement.
CO3	An understanding of some ethical and professional issues that are important forsoftware engineers.

CO4	To develop an ability to look at the Computer Science discipline from SoftwareEngineering Systems perspective.
CO5	

(A) Human computerInteraction

CO1	Demonstrate an understanding of guidelines, principles, and theories influencinghuman computer interaction.
CO2	Describe the key design principles for user interfaces.
CO3	Carry out the steps of experimental design, usability and experimental testing, andevaluation of human computer interaction systems.
CO4	Develop and implement a process to gather requirements for, engage in iterativedesign of, and evaluate the usability of a user interface.
CO5	

(B) Numerical Methods

CO1	Determine an interpolating function for data.
CO2	Solve initial value problems.
CO3	Aware of the use of numerical methods in modern scientific computing.
CO4	Students would be able to assess the approximation techniques to formulate andapply appropriate strategy to solve real world problems.

Economics and Management

At the end course student will be able to	
CO1	Elaborate the concepts of managerial economics
CO2	Analyze the issues related to demand, supply and market
CO3	Use different tools for demand analysis and forecasting
CO4	Analyze the production and cost functions
CO5	Decide price on the basis of market, demand and supply.
CO6	Analyze the various financial aspects of the organisation.

Semester – VI

Compiler Design

CO1	To inform students about different parsing techniques, techniques to generateintermediate code and different optimization techniques.
CO2	To enrich the knowledge in various phases of compiler and its use.
CO3	To introduce the concepts underlying the design and implementation of languageprocessors.
CO4	To provide practical programming skills necessary for constructing a compiler.
CO5	

Computer Networks

CO1	To develop an understanding of modern network architectures from a design andperformance perspective.
CO2	Analyze the requirements for a given organizational structure and select the mostappropriate networking architecture and technologies.
CO3	To study protocols, network standards, the OSI model, IP addressing, cablingnetworking components, and basic LAN design.
CO4	Ability to write program using socket programming.
CO5	

Machine Learning

CO1	.Have a good understanding of the fundamental issues and challenges of machine learning:
CO2	Data, model selection, model complexity, etc. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
CO3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning
CO4	Be able to design and implement various machine learning algorithms in a range of real-world applications.

Elective – IV

Internet of Things

CO1	To learn the basic issues, policy and challenges in the Internet.
CO2	To get an idea of some of the application areas where Internet of Things can beapplied.
CO3	To understand the cloud and Internet environment.
CO4	To understand the various modes of communications with Internet.
CO5	

Semester – VII

Artificial Intelligence

CO1	To understand the notions of rational behavior and intelligent agents.
CO2	To develop a general appreciation of the goals, subareas, achievements and difficultiesof AI.
CO3	To provide the knowledge of methods of blind as well as informed

	search and ability to practically apply the corresponding techniques.
CO4	To develop general understanding of major concepts and approaches in knowledge representation, planning, learning, robotics and other AI areas.
CO5	To developing programming skills for AI applications & exposure to logic programming with Prolog.

Cloud Computing

CO1	Understand various basic concepts related to cloud computing technologies.
CO2	To demonstrate an understanding of Service models, deployment models, Virtualization.
CO3	Understand different cloud programming platforms and tools.
CO4	Create application by utilizing cloud platforms such as Google app Engine and Amazon Web Services (AWS)
CO5	Be familiar with cloud programming using Google's 'Go' programming language.

Elective – VI

Distributed System

CO1	To learn the principles, architectures, algorithms and programming models used in distributed systems.
CO2	Ability to write distributed programs using sockets, RPC/RMI, etc.
CO3	Appreciation of the differences in the handling of issues like mutual exclusion, deadlock detection, fault handling, etc. in a centralized system and a distributed system.
CO4	To gain experience in the application of fundamental Computer Science methods and algorithms in the development of distributed systems and distributed systems applications.
CO5	

Open Elective – VII

Cryptography and Network Security

CO1	To understand the network security, services, attacks, mechanisms, types of attacks.
CO2	To understand cryptographic techniques for encryption, hashing, signature.
CO3	Develop an understanding of security policies (authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.
CO4	Deploy the cryptographic techniques to detect and prevent basic security threats.
CO5	

Block chain Technology

CO1	To understand the basic concepts and technology used for blockchain
CO2	Illustrate the concepts of Bitcoin and their usage.
CO3	Apply security features in blockchain technologies.
CO4	Use smart contract in real world applications.
CO5	Analyze the working of Smart Contracts
CO6	Integrate ideas from blockchain technology into their own projects.