Program outcomes, program specific outcomes and course outcomes for all programs offered by the institution

i) Name of the Department: Civil Engineering

Programs Outcomes: Engineering Graduates will have

- PO1: An ability to apply knowledge of mathematics, science and engineering.
- PO2:An ability to design and conduct field and laboratory experiments
- PO3:An ability to design a system to meet desired needs within realistic constraints such as economic, environmental, social, safety and sustainability.
- PO4: An ability to function effectively on interdisciplinary and multidisciplinary teams to accomplish a common goal.
- PO5: An ability to identify formulate and solve civil engineering problems
- PO6: An understanding of professional and ethical responsibility while discharging civil engineering related works
- PO7: An ability to convey technical material through oral presentations and written papers and reports
- PO8: Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
- PO9: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- PO10: knowledge of contemporary issues and environmental impact in civil engineering practice.
- PO11: Understanding the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- PO12: An ability interpret data in two or more of the following areas: structural engineering, geotechnical engineering, hydraulics, construction materials and environmental engineering

- PSO1: An ability to propose sustainable solutions by applying technical know-how and managerial skills in Planning, design and execution of civil infrastructure
- PSO2: An ability to perform exceedingly well in academics to pursue higher studies and succeed in civil engineering services examinations.

Course Outcomes:

Year	Name of the Course (Subject)	Course Outcomes
Second Year SEM I	1Building Technology and Architectural Planning	CO1: Identify types of building and basic requirements of building components CO2: Make use of Architectural Principles and Building byelaws for building construction. CO3: Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects. CO4: Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.
	2Mechanics of structure	CO1: Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures CO2 Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram. CO3 Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains CO4 Analyze axially loaded and eccentrically loaded column.
	3 Fluid Mechanics	CO1: Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems. CO2 Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow CO3 Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow. CO4Understand the concept of laminar and turbulent flow and flow through pipes and its .
	4 Engineering Mathematics III	CO1:Solve Higher order linear differential equations and its applications to modelling and analyzing Civil engineering problems such as bending of beams, whirling of shafts and massspring systems. CO2. Solve System of linear equations using direct & iterative numerical techniques and developsolutions for ordinary differential equations using single step & multistep methods applied tohydraulics, geotechnics and structural systems. CO3Apply Statistical methods like correlation, regression and probability theory in data analysisand predictions in civil engineering CO4Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flowproblems CO5 Solve Partial differential equations such as wave equation, one- and two-dimensional heat flow equations
	5Engineering Geology	CO1: Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions. CO2 Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability. CO3 Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities CO4 Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/ level free from geological defects
Second Year Sem II	1Geotechnical Engineering	CO1: Differentiate the different types of soil and their engineering properties and classify them CO2 Determine the soil properties in laboratory and develop a proficiency in handling experimental data. CO3 Understand of the concept of effective stress and its influence on soil behavior CO4 Develop an understanding of the influence of water flow on the engineering behavior of soils.
	2 Survey	CO1: Define and Explain basics of plane surveying and differentiate the instruments used for it. CO2 Express proficiency in handling surveying equipment and analyze the surveying data from these equipment.

		CO3 Describe different methods of surveying and find relative positions of points on the surface of earth. CO4 Execute curve setting for civil engineering projects such as roads, railways etc CO5 Articulate advancements in surveying such as space based positioning systems CO6 Differentiate map and aerial photographs, also interpret aerial photographs.
	3 Concrete Technology	CO1: students will be familiar with properties of different ingredients of concrete CO2 students will be familiar with different admixtures CO3students will be familiar with properties of fresh and hardened concrete CO4 students will be able to prepare concrete mix design
	4 Structural Analysis	CO1: Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams. CO2Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames. CO3Implement application of the slope deflection method to beams and portal frames CO4 Analyze beams and portal frames using moment distribution method. CO5Determine response of beams and portal frames using structure approach of stiffness matrix method. CO6Apply the concepts of plastic analysis in the analysis of steel structures
	5 Project management	CO1: Describe project life cycle and the domains of Project Management CO2 Explain networking methods and their applications in planning and management CO3Categorize the materials as per their annual usage and also Calculate production rate of construction equipment CO4Demonstrates resource allocation techniques and apply it for manpower planning. CO5Understand economical terms and different laws associated with project management CO6 Apply the methods of project selection and recommend the best economical project.
Third Year Sem I	1 Hydrology and water resource engineering.	CO1: Various components of hydrologic cycle that affect the movement of water in the earth CO2 Various Stream flow measurements technique CO3 The concepts of movement of ground water beneath the earth CO4 The requirements of irrigation & various irrigation techniques, requirements of the crops CO5 Apply math, science, and technology in the field of water resource
	2 Infrastructure Engineering and Construction Techniques	CO1: Meaning and scope of Infrastructure Engineering CO2 Railways and there component CO3 New Construction Techniques their purpose and construction method CO4 Types of tunnel Criteria for selection of size & shape of tunnels. Ventilation in tunneling-temporary and permanent, Micro CO5 Tunneling and trenchless tunneling. CO6 Construction Equipments Economic maintenance & repair of construction equipment.
	3 Structural Design-I	CO1:Understanding of the design philosophies and behavior of structural steel CO2Ability to analyze and design of tension /Compression members CO3Ability to analyze and design of columns CO4Ability to analyze and design of beams CO5 Ability to analyze and design of beam-columns CO6Ability to analyze and design of simple bolted and welded connections CO7Ability to design steel framing system and connections of a building .
	4 Structural Analysis-II	CO1: Calculate static and kinematic degree of indeterminacy of structure CO2Analyze the statically indeterminate beams and pin jointed trusses by any of the appropriate force methods CO3Analyze the kinematically indeterminate beams and pin jointed trusses by any of the appropriate displacement methods CO4 Analyze the 2-D rigid jointed rectangular portal frame by any of the relevant force methods and relevant displacement methods CO5 Calculate the deflection of the beam by using any of the available methods. CO6 Understand the concepts involved in finite analysis methods to idealize any structure for the purpose of design.
	5 Fluid Mechanics II	CO1: Water conveyance : The piping system which delivers this employs various fluid dynamics principles for conveyance, filtration, purification, pumping, lifting etc CO2Irrigation and farming : Indira Gandhi canal which is one of the biggest canal projects which helped the Green Revolution. The hydraulics applied to the design are pretty

		intricate. Canals like these have powered the agricultural sector in ways one cannot fathom CO3 Heating and ventilation: The comfort of sitting inside a temperature regulated room (especially during summer) equates to mental peace. The labyrinth network of pipes and ducts are designed using simulations and applied fluid mechanics. CO4 Food Processing Industry: The mixing and agitation of a wide range of liquids is simulated before implementation and prototyping. This ensures the right amount of material is used and quality can be ensured.
Third Year Sem II	1 Advanced Surveying	CO1: Apply the knowledge of geometric principles to arrive at **surveying** problems CO2 The knowledge of limits of accuracy will be obtained by making measurements with various surveying equipment employed in practice CO3 Use modern instruments to obtain geo-spatial data and analyze the same to appropriate engineering problems CO4Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments
	2 Project Management and Engineering Economics	CO1: Describe project life cycle and the domains of Project Management. CO2 Explain networking methods and their applications in planning and management CO3 Categorize the materials as per their annual usage and also Calculate production rate of Construction equipment CO4 Demonstrates resource allocation techniques and apply it for manpower planning CO5 Understand economical terms and different laws associated with project management CO6 Apply the methods of project selection and recommend the best economical project
	3 Foundation Engineering	CO1: Subsurface Investigations for Foundations Purpose and planning of subsurface exploration. Methods of Investigation CO2 Bearing capacity andShallow Foundation CO3Settlement: - Introduction, Causes of settlement, Consolidation settlement spring analogy, Terzaghi's consolidation theory CO4Deep FoundationsIntroduction, Pile classification, Pile installation-Cast in situ, driven and bored pile CO5Cofferdams and Foundation on Black Cotton Soils CO6Soil Reinforcement and Earthquake Geodetics.
	4 Structural Design-II	CO1: Analyze and design reinforced concrete flexural members CO2 Analyze and design reinforced concrete compression members CO3 Analyze and design shear reinforcement.
	5 Environmental Engineering-I	CO1: Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil CO2 Understand about water supply system CO3 Understand about water treatment and various methods of treatment CO4 Be able to analyze an industrial activity and identify the environmental problems CO5 Be able to plan strategies to control, reduce and monitor pollution. CO6 Be able to select the most appropriate technique to purify and/or control the emission of pollutants. CO7 Be able to apply the basis of an Environmental Management System (EMS) to an industrial activity
	6 Seminar	CO1: To increase the interest of student in active learning CO2 To increase the presentation skill as well as stage daring of students. CO3 To elaborate the theoretical knowledge of civil in to actual construction CO4 To increase research knowledge about civil engineering work. CO5 To develop communication skill, group discussion etc. of student.
Final Year Sem I	1 Environmental Engineering II	CO1: The students would estimate sewage generation, understand the characteristics and composition of sewage. CO2 The students would design sewer system including sewage pumping stations. CO3 The students would perform the basic design of the unit operations and processes that are used in primary treatment of sewage treatment. CO4 The students would perform the basic design of the unit operations and processes that are used in secondary treatment of sewage treatment. CO5 The students would understand self-purification of streams. The students would design disposal methods for treated sewage and would estimate sludge generation and understand management of sludge.
	2 Transportation Engineering	CO1:Understand basic concept of Highway engineering CO2 To understand the principles of Highway geometric design as per IRC standards CO3 To understand basic concept of highway design

		CO4 To understand types of pavements and material requirement for highway construction CO5 To understand maintenance procedure for different type of pavement CO6 To understand the traffic engineering and different types of traffic control device CO7 To understand basic idea about the bridge engineering and component parts of a bridge
	3 Structural Design and Drawing III	CO1:We studied Prestressed concrete structures- Introduction- Basic concepts,-materials- various Pretensioning and post tensioning systems,-concept of Losses. CO2Design of one way and two way post tensioned slabs (Single panel only) Earthquake loads by seismic coefficient method- Estimation of combined effect of Lateral and vertical loading in multi storeyed frames. CO3Design of an intermediate continuous beam within the above structure.Design of Water tanks- circular and rectangular with flexible and rigid base- resting on ground by approximate and IS code method. CO4Design of Cantilever retaining wall- Tee and L shapes.
	4 Advanced Concrete Technology	CO1: Students are able to decide the use of supplement cement in concrete, use of different admixture and its application as per requirement CO2 Students are capable to understand the special concrete, its properties and application as per requirement. CO3 Students are able to do concrete mix design for required strength of concrete with different approach CO4 Students are able to know details of ready mix concrete plant. CO5 Students are able to understand the durability of concrete, assessment and inspection of hardened concrete
	5 TQM & MIS in Civil Engineering	CO1:To understand the concept of quality CO2To have exposure to challenges in quality improvement programs CO3Identify requirement of quality improvement programs CO4To implement quality improvement program CO5 To implement quality improvement program CO6 To understand multiple online systems, analyzes the information, and reports data to aid in management decision-making.
Final Year Sem II	1 Dams and Hydraulic Structures	CO1:Understand the design aspects of various hydraulic structures on permeable foundation and their causes of failure. CO2. Plan and design the efficient silt control structures and relevant river training works. CO3Plan and design suitable transition structures for subcritical and supercritical flow conditions using standard available methods. CO4 Plan and design of canal regulation works CO5 Understand the commonly used methods of e peak floods estimation required for the design of various components of water resources projects. CO6. Understand the concepts of the flood routing and make assessment of maximum reservoir level leading to proper estimation of free board and height of flood protection.
	2 Quantity Surveying, Contracts and tenders	CO1:Estimate of quantities for a Residential Building & Abstract cost Estimate CO2Design and Prepare Bar bending schedule for reinforcement works. CO3Estimate the calculation of earth work quantity for roads and canals. CO4Analyse the rates of work quantities and labour. CO5 Analyse different types of contracts, tender document for building & valuation
	3 Hydropower Engineering	CO1: Able to explain need and advantages of water energy over the other different energy sources, basis of hydrological analysis, classification of energy resources, hydropower development and potential of India. CO2 Able to classify hydropower plant on various basis, Micro hydro scheme, describe different components in hydropower plant CO3 Able to analyze electrical load on turbines, different factors in power load assessment, load duration curve, prediction of load. CO4 Able to explain types of power house, layouts of power house, different power plant equipments, instrumentation and control in power house. CO5Able to classify and select turbines, governing of turbines, water hammer phenomenon, surge tanks and draft tube, cavitations in turbines, analyze impulse and reaction turbines. CO6 Able to explain pricing of electricity, list various policies of electricity act-2003, recognize importance of carbon credit in power generation, private participation and investment policies in power sector.
	4 Construction	CO1: Apply knowledge, techniques, skills, and tools of the construction industry in

	Management	construction activities. CO2 Function effectively as members or leaders on construction teams; CO3 Communicate effectively regarding subjects related to construction activities CO4Demonstrate an understanding of professional and ethical responsibilities and commitment to quality, timeliness, and continuous improvement. CO5create a construction project safety plan and project schedules CO6create construction project cost estimates. CO7Analyse construction documents for planning and management of construction processes and methods, materials, and equipment used to construct projects. CO8apply construction management skills as a member of a multi- disciplinary team
	5 project	CO1: Ability to engage in independent study to research literature in the identified domain CO2 Ability to consolidate the literature search to identify and formulate the engineering problem CO3 Ability to identify the community that shall benefit through the solution to the identified engineering problem and also demonstrate concern for environment CO4 Ability to engage in independent study to identify the mathematical concepts, science concepts, engineering concepts and management principles necessary to solve the identified engineering problem CO5 Ability to select the engineering tools/components for solving the identified engineering problem CO6 Ability to analyse and interpret results of experiments conducted on the designed solution(s) to arrive at valid conclusions

ii) Name of the Department: Electronics and Telecommunication Engineering

Program Educational Objectives:

1. PEO1: To prepare students with strong foundation in mathematical, scientific and engineering fundamentals to excel in their career.
2. PEO2: To prepare students for technological changes through domain knowledge and extend their skills across the range of disciplines.
3. PEO3**:** To prepare students for continuous professional and social development through soft skills and self-learning abilities.
4. PEO4**:**To prepare students having research aptitude and an approach to problem solving.
5. PEO5**:**To prepare students for life-long learning.

Programs Outcomes:

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2:Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3:Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4:Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5:Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6:The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7:Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8:Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9:Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10:Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11:Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- P012:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

- PSO1:Apply concepts and knowledge of mathematics, basic electronics engineering to various areas like Signal processing, Embedded Systems, VLSI, Communication engineering etc.
- PSO2:Design and analyze Electronic Engineering problem with given specification
- PSO3:Implement Electronic and Communication system using appropriate hardware and software tools, keeping in mind, its societal and environmental effect.

Course Outcomes: (Sem I)

Year	Name of the Course (Subject)	Course Outcomes
Second Year	Engineering Mathematics III	CO1: Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control system. CO2: Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems. CO3: Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing. CO4: Perform vector differentiation & integration, analyze the vector fields and apply to electro-magnetic fields & wave theory. CO5: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.
	Electronic Circuit	CO1: Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier. CO2: Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications. CO3 : Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies. CO4: Explain internal schematic of Op-Amp and define its performance parameters. CO5: Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications. CO6: Understand and compare the principles of various data conversion techniques and PLL with their applications.
	Digital Circuits	CO1: Identify and prevent various hazards and

		timing problems in a digital design. CO2: Use the basic logic gates and various reduction techniques of digital logic circuit. CO3: Analyze, design and implement combinational logic circuits. CO4: Analyze, design and implement sequential circuits. CO5: Differentiate between Mealy and Moore machines. CO6: Analyze digital system design using PLD.
	Electrical Circuits	CO1: Analyze the simple DC and AC circuit with circuit simplification techniques. CO2: Formulate and analyze driven and source free RL and RC circuits. CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function. CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors. CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles. CO6: Analyze and select a suitable motor for different applications.
	Data structures	CO1: Solve mathematical problems using C programming language. CO2: Implement sorting and searching algorithms and calculate their complexity. CO3: Develop applications of stack and queue using array . CO4: Demonstrate applicability of Linked List. CO 5: Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity. CO 6: Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.
Third Year	Digital Communication	CO1: Understand working of waveform coding techniques and analyse their performance. CO2 : Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. CO3: Perform the time and frequency domain analysis of the signals in a digital communication system. Co4: Design of digital communication system. CO5: Understand working of spread spectrum communication system and analyze its performance.
	Digital Signal processing	CO1: Analyze the discrete time signals and system using different transform domain techniques. CO2:Design and implement LTI filters for filtering different real world signals. CO3: Develop different signal processing applications using DSP processor.
	Electromagnetics	CO1: Understand the basic mathematical concepts related to electromagnetic vector fields. CO2:Apply the principles of electrostatics to

		the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density. CO3: Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density. CO4: Understand the concepts related to Faraday's law, induced emf and Maxwell's equations. Co5 : Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
	Microcontrollers	CO1: Learn importance of microcontroller in designing embedded application. CO2: Learn use of hardware and software tools. CO3:Develop interfacing to real world devices.
	Mechatronics	CO1: Identification of key elements of mechatronics system and its representation in terms of block diagram CO2:Understanding basic principal of Sensors and Transducer. CO3:Able to prepare case study of the system given.
Final Year	VLSI Design & Technology	Co1: Write effective HDL coding for digital design. CO2: Apply knowledge of real time issues in digital design. CO3:Model digital circuit with HDL, simulate, synthesis and prototype in PLDs. CO4: Design CMOS circuits for specified applications. CO5: Analyze various issues and constraints in design of an ASIC Co6Apply knowledge of testability in design and build self test circuit.
	Computer Networks & Security	Co1: Understand fundamental underlying principles of computer networking Co2: Describe and analyze the hardware, software, components of a network and theirinterrelations. Co3: Analyze the requirements for a given organizational structure and select the most appropriatenetworking architecture and technologies CO4: Have a basic knowledge of installing and configuring networking applications. CO5: Specify and identify deficiencies in existing protocols, and then go onto select new and betterprotocols. Co6: Have a basic knowledge of the use of cryptography and network security.
	Radiation & Microwave Techniques	CO1: Differentiate various performance parameters of radiating elements. CO2: Analyze various radiating elements and arrays. CO3: Apply the knowledge of waveguide fundamentals in design of transmission lines.

		Co4 :Design and set up a system consisting of various passive microwave components. C05: Analyze tube based and solid state active devices along with their applications. CO6:Measure various performance parameters of microwave components.
	Internet of Things (Elective I)	CO1: On completion of the course, student will be able to CO2: Understand the various concepts, terminologies and architecture of IoT systems. C03: Use sensors and actuators for design of IoT. CO4: Understand and apply various protocols for design of IoT systems CO5: Use various techniques of data storage and analytics in IoT CO6: Understand various applications of IoT
	Electronics Product Design (Elective II)	Co1: Understand various stages of hardware, software and PCBdesign. CO2: Importance of product test &testspecifications. Co3: Special design considerations and importance ofdocumentation.

SEM-II

Year	Name of the Course (Subject)	Course Outcomes
Second Year	Signals & Systems	CO1: Identify, classify basic signals and perform operations on signals. CO2: Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals. CO3: Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform. CO4: Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms. CO5: Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF. CO6: Compute the mean, mean square, variance and standard deviation for given random variables using PDF.
	Control Systems	CO1: Determine and use models of

		physical systems in forms suitable for use in the analysis and design of control systems. CO2: Determine the (absolute) stability of a closed -loop control system. CO3: Perform time domain analysis of control systems required for stability analysis. CO4: Perform frequency domain analysis of control systems required for stabilit y analysis. CO 5: Apply root-locus, Frequency Plots technique to analyze control systems. CO 6: Express and solve system equations in state variable form. CO7: Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.
	Principles of Communication Systems	CO1: To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study. CO2: Describe and analyze the techniques of generation, transmission and rec eption of Amplitude Modulation Systems. CO3: Explain generation and detection of FM systems and compare with AM systems. CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM). CO5: Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM). CO6: Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.
	Object Oriented Programming	CO1: Describe the principles of object oriented programming. CO2: Apply the concepts of data encapsulation, inheritance in C++.

		CO3: Understand Operator overloading and friend functions in C++. CO4: Apply the concepts of classes, methods inheritance and polymorphism to write programs C++. CO5: Apply Templates, Namespaces and Exception Handling concepts to write programs in C++. CO6: Describe and use of File handling in C++.
Third Year	Power Electronics	CO1: Design & implement a triggering / gate drive circuit for a power device CO2: Understand, perform & analyze different controlled converters. Evaluate battery backup time & design a battery charger. CO4: Design & implement over voltage / over current protection circuit.
	Information Theory, Coding and Communication Networks	CO1: Perform information theoretic analysis of communication system. CO2: Design a data compression scheme using suitable source coding technique. Co3 :Design a channel coding scheme for a communication system. CO4 :Understand and apply fundamental principles of data communication and networking. Co5:Apply flow and error control techniques in communication networks.
	Business Management	CO1: Get overview of Management Science aspects useful in business. CO2: Get motivation for Entrepreneurship CO3: Get Quality Aspects for Systematically Running the Business CO4: o Develop Project Management aspect and Entrepreneurship Skills.
	Advanced Processors	CO1: Describe the ARM microprocessor architectures and its feature. CO2: Interface the advanced peripherals to ARM based microcontroller CO3: Design embedded system with available resources. CO4: Use of DSP Processors and resources for signal processing applications.
	System Programming and Operating Systems	CO1: Demonstrate the knowledge of Systems Programming and Operating Systems CO2: Frmulate the Problem and develop the solution for same CO3: Compare and analyse the different implementation approach of system programming operating system abstractions. Co4: Interpret various OS functions used in Linux / Ubuntu
Final Year	Mobile Communicatio	Co1: Apply the concepts of switching technique and traffic engineering to

		design multistage networks. CO2: Explore the architecture of GSM. CO3:Differentiate thoroughly the generations of mobile technologies
	Broadband Communication Systems	Co1: Perform Link power budget and Rise Time Budget by proper selection of components and check its viability. Co2: Perform Satellite Link design for Up Link and Down Link.
	PLC s and Automation	Co1: Understand PLC architecture Co2: Develop PLC ladder programs for simple industrial applications CO3: Design Automation systems for industrial applications CO4: Implement the Engineering Automation using PLC approach.
	Wireless Sensor Networks	Co1: Explain various concepts and terminologies used in WSN CO2:. Describe importance and use of radio communication and link management in WSN Co3:Explain various wireless standards and protocols associated with WSN CO4: Recognize importance of localization and routing techniques used in WSN Co5: Understand techniques of data aggregation and importance of security in WSN CO6:.Examine the issues involved in design and deployment of WSN

iii) Name of the Department: Mechanical Engineering

Program Educational Objectives:

1. PEO1: To develop students with a sound technical knowledge for a successful career in industries, government/research organizations, academia, and higher studies and to demonstrate entrepreneurship.
2. PEO2**:** To prepare students with expertise in use of modeling, analysis and programming softwares.
3. PEO3**:** To prepare students to work effectively as individual and as team member in multidisciplinary projects and demonstrate managerial and entrepreneurial skills.
4. PEO4:To prepare students to engage in lifelong learning, career enhancement and adopt to changing professional and societal needs.

Programs Outcomes:

- **PO1:Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2:Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3:Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8:Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10:Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11:Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12:Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

- **PSO1.** Design and Manufacture mechanical components and systems.
- **PSO2.** Model and Analyze machine components using Creo-Parametric, ANSYS, MasterCAM, and MATLAB.
- **PSO3.** Specify, analyze and determine the performance of thermal systems including IC engines, Refrigeration and Air Conditioning Systems, Air Compressors, Hydraulic Turbines and Pumps.

Course Outcomes: (Sem I)

Year	Name of the Course (Subject)	Course Outcomes
Second Year	**Solid Mechanics**	CO1. DEFINE various types of stresses and strain developed on determinate and indeterminate members. CO2. DRAW Shear force and bending moment diagram for various types of transverse loading and support. CO3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam. CO4. CALCULATE torsional shear stress in shaft and buckling on the column. CO5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element. CO6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.
	Solid Modeling and Drafting	CO1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management CO2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry CO3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system CO4. APPLY geometric transformations to simple 2D geometries CO5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc. CO6. USE PMI & MBD approach for communication

	Engineering Thermodynamics	CO1. DESCRIBE the basics of thermodynamics with heat and work interactions. CO2. APPLY laws of thermodynamics to steady flow and non-flow processes. CO3. APPLY entropy, available and non available energy for an Open and Closed System, CO4. DETERMINE the properties of steam and their effect on performance of vapour power cycle. CO5. ANALYSE the fuel combustion process and products of combustion. CO6. SELECT various instrumentations required for safe and efficient operation of steam generator.
	Engineering Materials and Metallurgy	CO1. COMPARE crystal structures and ASSESS different lattice parameters. CO2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials. CO3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials. CO4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc. CO5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy. CO6. SELECT appropriate materials for various applications.
	Electrical and Electronics Engineering	CO1. APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems CO2. DEVELOP interfacing

		of different types of sensors and other hardware devices with Atmega328 based Arduino Board CO3. UNDERSTAND the operation of DC motor, its speed control methods and braking CO4. DISTINGUISH between types of three phase induction motor and its characteristic features CO5. EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems CO6. CHOOSE energy storage devices and electrical drives for EVs
	Geometric Dimensioning and Tolerancing Lab	CO1. SELECT appropriate IS and ASME standards for drawing CO2. READ & ANALYSE variety of industrial drawings CO3. APPLY geometric and dimensional tolerance, surface finish symbols in drawing CO4. EVALUATE dimensional tolerance based on type of fit, etc. CO5. SELECT an appropriate manufacturing process using DFM, DFA, etc.
Third Year	**Design of Machine Elements – I**	CO1.Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength. CO2.Ability to design Shafts, Keys and Coupling for industrial applications. CO3.Ability to design machine elements subjected to fluctuating loads. CO4.Ability to design Power Screws for various applications. CO5.Ability to design fasteners and welded joints subjected to different loading conditions. CO6.Ability to design various Springs for

		strength and stiffness.
	HEAT TRANSFER	CO 1: Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system. CO 2: Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction. CO 3: Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation. CO 4: Interpret heat transfer by radiation between objects with simple geometries. CO 5: Analyze the heat transfer equipment and investigate the performance.
	Theory of Machine – II	CO1.Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design. CO2.Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear. CO3.The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design. CO4.Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves. CO5.The student will

		synthesize a four bar mechanism with analytical and graphical methods. CO6.***a.*** The student will analyze the gyroscopic couple or effect for stabilization of Ship Aeroplane and Four wheeler vehicle. ***b.*** Student will choose appropriate drive for given application (stepped / step-less).
	Turbo Machines	CO1.Apply thermodynamics and kinematics principles to turbo machines. CO2.Analyze the performance of turbo machines. CO3.Ability to select turbo machine for given application. CO4.Predict performance of turbo machine using model analysis.
	Metrology And Quality Control	CO1.Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis. CO2. Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design CO3.Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately. CO4.Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement.
Final Year	**Hydraulics and Pneumatics**	CO1.Understand working

		principle of components used in hydraulic & pneumatic systems CO2.Identify various applications of hydraulic & pneumatic systems CO3.Selection of appropriate components required for hydraulic and pneumatic systems CO4.Analyse hydraulic and pneumatic systems for industrial/mobile applications CO5.Design a system according to the requirements CO6.Develop and apply knowledge to various applications
	CAD CAM and Automation	CO1.Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations. CO2.Use analytical and synthetic curves and surfaces in part modeling. CO3.Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software. CO4.Generate CNC program for Turning / Milling and generate tool path using CAM software. CO5.Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology. CO6.Understand the robot systems and their applications in manufacturing industries.
	Dynamics of Machinery	CO1.Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines. CO2.Estimate natural frequency for single DOF undamped& damped free

		vibratory systems. CO3.Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces. CO4.Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems. CO5.Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control. CO6.Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
	Elective – I **Finite Element Analysis**	CO1.Understand the different techniques used to solve mechanical engineering problems. CO2.Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses. CO3.Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results. CO4.Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis. CO5.Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer. CO6.Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical

		(round-off) errors.
	Elective – II **Automobile Engineering**	CO1.To compare and select the proper automotive system for the vehicle. CO2.To analyse the performance of the vehicle. CO3.To diagnose the faults of automobile vehicles. CO4.To apply the knowledge of EVs, HEVs and solar vehicles
	Project – I	CO1.Find out the gap between existing mechanical systems and develop new creative new mechanical system. CO2.Learn about the literature review CO3.Get the experience to handle various tools, tackles and machines.

SEM-II

Course Outcomes:

Year	Name of the Course (Subject)	Course Outcomes
Second Year	**Engineering Mathematics - III**	CO1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems. CO2. APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications. CO3. APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control. CO4. PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems. CO5. SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.
	Kinematics of Machinery	CO1. APPLY kinematic

		analysis to simple mechanisms CO2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method CO3. SYNTHESIZE a four bar mechanism with analytical and graphical methods CO4. APPLY fundamentals of gear theory as a prerequisite for gear design CO5. CONSTRUCT cam profile for given follower motion
	Applied Thermodynamics	CO1. DETERMINE COP of refrigeration system and ANALYZE psychrometric processes. CO2. DISCUSS basics of engine terminology,air standard, fuel air and actual cycles. CO3. IDENTIFY factors affecting the combustion performance of SI and CI engines. CO4. DETERMINE performance parameters of IC Engines and emission control. CO5. EXPLAIN working of various IC Engine systems and use of alternative fuels. CO6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors
	Fluid Mechanics	CO1. DETERMINE various properties of fluid CO2. APPLY the laws of fluid statics and concepts of buoyancy CO3. IDENTIFY types of fluid flow and terms associated in fluid kinematics CO4. APPLY principles of fluid dynamics to laminar flow CO5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface CO6. CONSTRUCT mathematical correlation considering dimensionless

		parameters, also ABLE to predict the performance of prototype using model laws
	Manufacturing Processes	CO1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process CO2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling CO3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations CO4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics CO5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques CO6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites
	Machine Shop	CO1. PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique CO2. MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques CO3. PERFORM cylindrical/surface grinding operation and CALCULATE its machining time CO4. DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine CO5. PREPARE industry visit report CO6. UNDERSTAND procedure of plastic processing
	Project Based Learning - II	CO1. IDENTIFY the real-world problem (possibly of interdisciplinary nature)

		through a rigorous literature survey and formulate / set relevant aims and objectives. CO2. ANALYZE the results and arrive at valid conclusions. CO3. PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge. CO4. CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures. CO5. USE of technology in proposed work and demonstrate learning in oral and written form. CO6. DEVELOP ability to work as an individual and as a team member.
Third Year	**Numerical Methods and Optimization**	CO1. Use appropriate Numerical Methods to solve complex mechanical engineering problems. CO2. Formulate algorithms and programming. CO3. Use Mathematical Solver. CO4. Generate Solutions for real life problem using optimization techniques. CO5. Analyze the research problem
	Design of Machine Elements – II	CO 1: To understand and apply principles of gear design to spur gears and industrial spur gear boxes. CO 2 : To become proficient in Design of Helical and Bevel Gear CO 3: To develop capability to analyse Rolling contact bearing and its selection from manufacturer's Catalogue. CO 4: To learn a skill to design worm gear box for various industrial applications.

		CO 5: To inculcate an ability to design belt drives and selection of belt, rope and chain drives. CO 6: To achieve an expertise in design of Sliding contact bearing in industrial applications.
	Refrigeration and Air Conditioning	CO1.Illustrate the fundamental principles and applications of refrigeration and air conditioning system CO2.Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems CO3.Present the properties, applications and environmental issues of different refrigerants CO4.Calculate cooling load for air conditioning systems used for various CO5.Operate and analyze the refrigeration and air conditioning systems.
	Mechatronics	CO1.Identification of key elements of mechatronics system and its representation in terms of block diagram CO2.Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O CO3.Interfacing of Sensors, Actuators using appropriate DAQ micro-controller CO4.Time and Frequency domain analysis of system model (for control application) CO5.PID control implementation on real time systems CO6.Development of PLC ladder programming and implementation of real life system.
	MANUFATCURING PROCESS – II	CO1.Student should be able to apply the

		knowledge of various manufacturing processes. CO2.Student should be able to identify various process parameters and their effect on processes. CO3.Student should be able to figure out application of modern machining. CO4.Students should get the knowledge of Jigs and Fixtures for variety of operations.
	MACHINE SHOP – II	CO1. Ability to develop knowledge about the working and programming techniques for various machines and tools
	SEMINAR	CO1. Establish motivation for any topic of interest and develop a thought process for technical presentation. CO2. Organize a detailed literature survey and build a document with respect to technical publications. CO3. Analysis and comprehension of proof-of-concept and related data. CO4. Effective presentation and improve soft skills. CO5. Make use of new and recent technology (e.g. Latex) for creating technical reports
	Audit Course II	CO1.Appreciate the concept of Entrepreneurship CO2.Identify entrepreneurship opportunity. CO3.Develop winning business plans
Final Year	**Energy Engineering**	CO1. Describe the power generation scenario, the layout components of

		thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle CO2. Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same CO3. Recognize the layout, component details of hydroelectric power plant and nuclear power plant CO4. Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle CO5. Emphasize the fundaments of non-conventional power plants CO6. Describe the different power plant electrical instruments and basic principles of economics of power generation.
	Mechanical System Design	CO1. Understand the difference between component level design and system level design. CO2. Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated. CO3. Learn optimum design principles and apply it to mechanical components. CO4. Handle system level projects from concept to product.
	Elective – III **Industrial Engineering**	CO1.Apply the Industrial Engineering concept CO2.Understand, analyze and implement different concepts involved in method study. CO3.Design and Develop different aspects of work system and facilities. CO4.Understand and Apply Industrial safety standards, financial management practices. CO5.Undertake project work based on modeling & simulation area.
	Elective – IV **Advanced Manufacturing Processes**	CO1.Classify and analyze special forming processes CO2.Analyze and identify

		applicability of advanced joining processes CO3.Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques CO4.Select appropriate micro and nano fabrication techniques for engineering applications CO5.Understand and apply various additive manufacturing technology for product development CO6.Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.

iv) Name of the Department: Computer Engineering

Program Educational Objectives:

Objective 1: Graduates will provide solutions to challenging problems in their profession by applying Computer Engineering theory and principles, as well as fundamentals of science, computing, and mathematics with the consideration of cost, safety, environmental, social, and human factors.

Objective 2: Graduates will communicate effectively, work collaboratively and exhibit high levels of professionalism and ethical responsibility.

Objective 3: Apply their skills in clear communication, responsible teamwork, and time management by, for example, managing a team or project, working on multidisciplinary project teams, or communicating with external stakeholders.

Objective4: Demonstrate professional attitudes and ethics by, for example, assisting colleagues in professional development (e.g. mentoring), engaging in continuing education or training, participating in professional societies, engaging in service to the community, or contributing to an employer's efforts to comply with software licensing, protect privacy, or assure quality and safety.

Programs Outcomes:

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

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

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

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

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

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

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

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

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

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

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

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

On completion of the B.E.(Computer Science & Engineering) degree the graduates will be able to

- PSO1: Apply standard Software Engineering practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver quality product for the organization success
- PSO2: Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics of varying complexity
- PSO3: Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

Course Outcomes:

Year	Name of the Course (Subject)	Course Outcomes
Second Year(SEM 1)	Data Structures & Algorithms	CO1: To identify & articulate the complexity goals and benefits of a good hashing scheme for real-world applications. CO2: To apply non-linear data structures for solving problems of various domain. CO3: To design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language. CO4: To analyze the algorithmic solutions for resource requirements and optimization CO5: To use efficient indexing methods and multiway search techniques to store and maintain data. CO6: To use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.
	Principals of Programming Languages(210255)	CO1: **Make** use of basic principles of programming languages. CO2: **Develop** a program with Data representation and Computations. CO3: **Develop** programs using Object Oriented Programming language Java. CO4: **Develop** application using inheritance, encapsulation, and polymorphism. CO5: **Demonstrate** Multithreading for robust application development. CO6: **Develop** a simple program using basic concepts of Functional and Logical programming paradigm
	Discrete Mathematics	Co1:Solve real world problems logically using appropriate set, function, and relation models and interpret the associated operations and terminologies in context. Co2: Analyze and synthesize the real world problems using discrete mathematics
	210244: Computer Graphics	**CO1: Identify** the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics. **CO2: Apply** mathematics to develop Computer

		programs for elementary graphic operations. **CO3: Illustrate** the concepts of windowing and clipping and **apply** various algorithms to fill and clip polygons. **CO4: Understand** and **apply** the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection. **CO5: Understand** the concepts of color models, lighting, shading models and hidden surface elimination. **CO6: Create** effective programs using concepts of curves, fractals, animation and gaming
	210242: Digital Electronics & Logic Design	Co1:Realize and simplify Boolean Algebraic assignments for designing digital circuits using KMaps. Co2: Design and implement Sequential and Combinational digital circuits as per the specifications. Co3: Apply the knowledge to appropriate IC as per the design specifications. Co4:Design simple digital systems using VHDL. Co5:Develop simple embedded system for simple real world application
Second Year(SEM 2)	207003: Engineering Mathematics III	Co1:Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits. Co2: Solve problems related to Fourier transform, Z-Transform and applications to Signal and Image processing. Co3:Apply statistical methods like correlation, regression analysis and probability theory for analysis and prediction of a given data as applied to machine intelligence. Co4:Perform vector differentiation and integration to analyze the vector fields and apply to compute line, surface and volume integrals. Co5: Analyze conformal mappings, transformations and perform contour integration of complex functions required in Image processing, Digital filters and Computer graphics.
	Object Oriented Programming (210243)	**CO1: Apply** constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software. **CO2: Design** object-oriented solutions for small systems involving multiple objects. **CO3: Use** virtual and pure virtual function and complex programming situations. **CO4: Apply** object-oriented software principles in problem solving. **CO5: Analyze** the strengths of object-oriented programming. **CO6: Develop** the application using object oriented programming language(C++).
	210253: Software Engineering	**CO1: Analyze** software requirements and formulate design solution for a software.

		CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns. **CO3: Apply** new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development. **CO4: Model** and design User interface and component-level. **CO5: Identify** and handle risk management and software configuration management. **CO6: Utilize** knowledge of software testing approaches, approaches to verification and validation. **CO7: Construct** software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.
	210254: Microprocessor	CO1: Exhibit skill of assembl ylanguage programming for the application. CO2: Classify Processor architectures. CO3: Illustrate advanced features of 80386 Microprocessor. CO4: Compare and contrast different processor modes. CO5: Use interrupts mechanism in applications CO6: Differentiate between Microprocessors and Microcontrollers. CO7: Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.
	210252: Advanced Data Structures	Co1:To apply appropriate advanced data structure and efficient algorithms to approach the problems of various domain. Co2:To design the algorithms to solve the programming problems. Co3:To use effective and efficient data structures in solving various Computer Engineering domain problems. Co4: To analyze the algorithmic solutions for resource requirements and optimization Co5:To use appropriate modern tools to understand and analyze the functionalities confined to the data structure usage.
	Computer Networks (310245)	Co1:Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies

Third Year (Sem 1)		Co2:Demonstrate design issues, flow control and error control Co3:Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols. Co4:Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community. Co5: Illustrate Client-Server architectures and prototypes by the means of correct standards and technology. Co6: Demonstrate different routing and switching algorithms
	Software Engineering and Project Management	Co1:Decide on a process model for a developing a software project Co2:Classify software applications and Identify unique features of various domains Co3: Design test cases of a software system. Co4:Understand basics of IT Project management. Co5:Plan, schedule and execute a project considering the risk management. Co6:Apply quality attributes in software development life cycle.
	Information Systems and Engineering Economics	Co1:Understand the need, usage and importance of an Information System to an organization. Co2: Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization. Co3:Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations Co4:Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry. Co5:Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. Co6:Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.

	310242 : Database Management Systems	Co1:Design E-R Model for given requirements and convert the same into database tables. Co2 Use database techniques such as SQL & PL/SQL. Co3: Use modern database techniques such as NOSQL. Co4: Explain transaction Management in relational database System. Co5: Describe different database architecture and analyses the use of appropriate architecture in real time environment. Co6: Students will be able to use advanced database Programming concepts Big Data – HADOOP
Third Year (Sem 2)	310251: Systems Programming and Operating System	Co1:Analyze and synthesize system software Co2:Use tools like LEX & YACC. Co3: Implement operating system functions.
	310253: Software Modeling and Design	Co1:Analyze the problem statement (SRS) and choose proper design technique for designing webbased/ desktop application Co2:Design and analyze an application using UML modeling as fundamental tool Co3:Apply design patterns to understand reusability in OO design Co4:Decide and apply appropriate modern tool for designing and modeling Co5:Decide and apply appropriate modern testing tool for testing web-based/desktop application
	310252: Embedded Systems and Internet of Things	CO1-Implement an architectural design for IoT for specified requirement CO2-Solve the given societal challenge using IoT Co3- Choose between available technologies and devices for stated IoT challenge
	310254: Web Technology	Co1:analyze given assignment to select sustainable web development design methodology CO2: develop web based application using suitable client side and server side web technologies Co3:develop solution to complex problems using appropriate method, technologies, frameworks, web services and content management
	Design and Analysis of Algorithm(310250)	CO1:Formulate the problem Analyze the asymptotic performance of algorithms CO2: Decide and apply algorithmic strategies to solve given problem CO3: Find optimal solution by applying various methods CO4: Find optimal solution by applying various methods
Final Year(SEM 1)	HPC(SEM-I)	CO1:Describe different parallel architectures, inter-connect networks, programming models.

		CO2:Develop an efficient parallel algorithm to solve given problem. CO3:Analyze and measure performance of modern parallel computing systems. CO4:Build the logic to parallelize the programming task.
	STQA(SEM-I-EL-II)	CO1:Describe fundamental concepts in software testing such as manual testing, automationtesting and software quality assurance. CO2:Design and develop project test plan, design test cases, test data, and conduct test operations CO3:Apply recent automation tool for various software testing for testing software CO4:Apply different approaches of quality management, assurance, and quality standard to software system CO5:Apply and analyze effectiveness Software Quality Tools
	410242 Artificial Intelligence and Robotics	CO1- Identify and apply suitable Intelligent agents for various AI applications CO2- Design smart system using different informed search / uninformed search or heuristic approaches. CO3- Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem. CO3- Apply the suitable algorithms to solve AI problems
	Data Analytics	CO1:Write case studies in Business Analytic and Intelligence using mathematical models CO2- Present a survey on applications for Business Analytic and Intelligence CO3-Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
	410244(B): Software Architecture and Design	Co1: Express the analysis and design of an application Co2:Specify functional semantics of an application Co3: Evaluate software architectures Co4:Select and use appropriate architectural styles and software design patterns
	Project Work I	CO1: Solve real life problems by applying knowledge. CO2:Analyze alternative approaches, apply and use most appropriate one for feasible solution. CO3: Write precise reports and technical documents in a nutshell. CO4: Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, CO5: Inter-personal relationships, conflict management and leadership quality
Final Year(SEM 2)	ML(SEM-II)	CO1:Distinguish different learning based applications

		CO2:Apply different preprocessing methods to prepare training data set for machine learning. CO3:Design and implement supervised and unsupervised machine learning algorithm. CO4:Implement different learning models CO5:Learn Meta classifiers and deep learning concepts
	410251: Information and Cyber Security	Co1:Gauge the security protections and limitations provided by today's technology. Co2:Identify information security and cyber security threats. Co3:Analyze threats in order to protect or defend it in cyberspace from cyber-attacks. Co4: Build appropriate security solutions against cyber-attacks.
	410252(B): Compilers	Co1: Design and implement a lexical analyzer and a syntax analyzer Co2:Specify appropriate translations to generate intermediate code for the given programming language construct Co3:Compare and contrast different storage management schemes Co4:Identify sources for code optimization
	Elective IV 410253(C): Cloud Computing	CO1:To install cloud computing environments. CO2:To develop any one type of cloud
	Project Work II	CO1:Show evidence of independent investigation CO2: Critically analyze the results and their interpretation. CO3: Report and present the original results in an orderly way and placing the open questions in the right perspective. Co4: Link techniques and results from literature as well as actual research and future research lines with the research. CO5: Appreciate practical implications and constraints of the specialist subject