CO PART I

CHEMICAL ENGINEERING	
	S.Y. B Tech Part-I Sem-III
Course Name:-	Engineering Mathametics –III
CO1	Determine Fourier series expansion of functions
CO2	Evaluate improper integrals involving trigonometric functions
CO3	Solve finite difference equations using Z transforms
CO4	Solve PDEs using variables separable method.
CO5	Evaluate improper integrals using residue theorem.
Course Name:-	Chemical Process Calculations
CO1	Perform basic calculations required in chemical industries.
CO2	Write mass and energy balance for various unit operations& processes in chemical industries.
CO3	Use mathematical knowledge for solving mass and energy balance problems
CO4	Use various mass and energy balance writing techniques in process design & in chemical process industries.
Course Name:-	Fluid Flow Operations
CO1	To have Knowledge of fundamental concepts in fluids, such as density, viscosity, pressure, stress/strain rate, etc. To have ability to apply mass, energy, and momentum balances to hydrostatic and fluid flow problems.
CO2	To have Ability to analyze frictional flow in pipes and piping networks, fluid flow in chemical engineering equipment
CO3	To provide students with a lasting and solid understanding of fluid mechanics
CO4	To learn how to properly set up and solve fluid mechanics problems both analytically and numerically where appropriate.
Course Name:-	Mechanical Operations
CO1	Students are expected to understand the basic principles of particles preparation and their characterization.
CO2	Students are expected to have an understanding of solid storage and their conveying in chemical process industries.
CO3	Students are expected to have an understanding of design of sedimentation tanks and other solid fluid separation equipments.
CO4	Students are expected to have knowledge about different size reducing equipments and power requirements during size reduction.
Course Name:-	Applied Engineering Chemistry
CO1	To understand basic principles of physical chemistry which may helpful in CRE & MT (by studying chemical kinetics, Nernst distribution law, solubility and distribution law, equilibrium constant, Catalysis.
CO2	To understand importance of organic chemistry in everyday life (by studying dyes, soap & detergents, biomolecules, Drugs and pesticides etc.)
CO3	To understand chemistry of dyes, soap & detergents, biomolecules, Drugs and pesticides etc.
CO4	To understand different unit processes in organic synthesis.
Course Name:-	Elective –I : Green technology
CO1	Understand principles and concepts of green chemistry
CO2	Develop manufacturing processes to reduce wastage and energy consumption
CO3	Design the technologies to reduce the level of emissions from buildings and core infrastructure
CO4	Analyze the effects of pollutants on the environment
Course Name:-	Mini Project -I
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement basic engineering knowledge.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical seminar based on the Mini Project work carried out.
T.E PART I SEM V	
Course Name:-	Process Instrumentation & Instrumental Methods of Analysis
CO1	Select appropriate instrument for a given chemical parameter
CO2	Calibrate instruments
CO3	Use various analytical methods for analysis of various industrial samples.
Course Name:-	Computer Techniques In Chemical Engineering
CO1	To solve chemical engineering problems.
CO2	Select a computational tool that is capable of solving a particular chemical engineering problem. Such tools include, EXCEL, POLYMATH, Visual Basic, Matlab, Aspen, polymath, and Scilab
CO3	Able to do modeling and simulation for unit operations and process in chemical engineering.
CO4	Able to solve various mathematical problems via programming.
Course Name:-	Mass Transfer –I
CO1	To able to design equipment for mass transfer operations, the rate equations are important which can be utilized for optimization concept.
CO2	Understand concept of steady state & unsteady state diffusional operations for controlling parameters in actual industrial process.
CO3	Understand the trouble shooting problem in actual operation
CO4	Implement the knowledge of various unit operations in the real plants.
Course Name:-	Chemical Engineering Thermodynamics-II
CO1	Solve Problem Related To Vapor – Liquid Equilibrium.
CO2	Calculate Partial Properties, Residual Properties And Excess Properties.
CO3	Use Thermodynamic Properties For Non-Ideal Systems.
CO4	Evaluate Equilibrium Constants And Composition For Reacting Systems.
Course Name:-	Chemical Equipment Design – I
CO1	Understand the practical applications of basic design engineering principles.
CO2	Understand design of piping systems
CO3	Understand design of storage equipments
CO4	Understand design of mixing and agitation equipments
CO5	Understand the relationship between process design and safety the ability to design a system, component, process to meet desired specifications.
CO6	Understand mechanical aspects of chemical equipment design and drawing of double shell and tube heat exchanger.
Course Name:-	Mini Project
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement basic engineering knowledge.
CO3	Prepare a technical report based on the Mini project.

CO4	Deliver technical seminar based on the Mini Project work carried out.
B.E. PART I SEM VII	
Course Name:-	**Chemical Processes & Green Technology**
CO1	Understand the detailed of chemical manufacturing process
CO2	Understand the role of chemicals for society
CO3	Understand flow sheeting of different process with unit operations and unit process involved.
CO4	Understand bio-fuel technology and importance of alternatives fuels for today's environment.
CO5	Application of knowledge for practical purposes
Course Name:-	**Transport Phenomena**
CO1	Understand, analyze and solve steady state problems, particularly in context of momentum, heat and mass transfer.
CO2	Analyze steady state shell momentum, energy and mass balance for laminar flow across various boundary conditions.
CO3	Apply equations of change in various co-ordinate systems and able to solve problems for cases that are well defined and also slightly defined.
CO4	Correlate the analogy between momentum, heat and mass transport.
Course Name:-	**Process Economics & Project Engineering**
CO1	Apply the chemical engineering knowledge to practical situations for the purpose of accomplishing something that will be economical and beneficial to the society
CO2	Understand and work problems that account for the time value of money, cash flows occurring at different times with different amounts, and equivalence at different interest rates.
CO3	Determine the breakeven for one or two alternatives and calculate the payback period.
CO4	Make computations for interest rates, rates of return and understand interest rate statements that include nominal and effective rates.
Course Name:-	**Elective -II Distillation**
CO1	Perform vapor liquid equilibrium calculations for ideal and non ideal systems.
CO2	Perform mass and energy balance calculations
CO3	Determine number of stages required for separation
CO4	Solve distillation problems using Lewis and McCabe Thiele methods, solve multi-component distillation problems using shortcut methods
Course Name:-	**Elective-III: Energy Conservation and Recovery**
CO1	Impart knowledge in the domain of energy conservation and recovery
CO2	Bring out Energy Conservation Potential
CO3	Inculcate knowledge and skills about assessing the energy efficiency in industry
Course Name:-	**Advanced Separation Processes**
CO1	Understand fundamentals of separation processes.
CO2	Understand various techniques to select separation process.
CO3	Understand various parameters affect on separations.
CO4	Understand application of separation processes in various industries
	F.Y M.Tech Sem-I
Course Name:-	**ADVANCED MOMENTUM TRANSFER**
CO1	Understand the analogous mechanism of momentum Transport for steady and unsteady flow.
CO2	Perform momentum balance for a given system at macroscopic and microscopic scale.
CO3	Solve the governing equations to obtain velocity profiles.
CO4	Model the momentum transport under turbulent conditions.
Course Name:-	**ELECTIVE - I ADVANCED HEAT TRANSFER**
CO1	Derive the governing differential equation for conduction and convection heat transfer
CO2	Solve the differential equation to obtain temperature profile in solid or fluid
CO3	Apply finite difference methods to solve problems in heat transfer
CO4	Calculate the net radiation loss from a surface in an enclosure of many surfaces
Course Name:-	**ADVANCED REACTION ENGINEERING**
CO1	Calculate reactor performance in situations where the observed reaction rate is significantly influenced by internal mass transfer in porous heterogeneous catalytic systems
CO2	Understand the energy balance and concentration profiles of multiphase reactors.
CO3	Estimate the performance of multiphase reactors in the situation such as temperature not uniform within the reactor and three phases are involved
CO4	Understand modern reactor technologies for mitigation of global warming
Course Name:-	**THERMODYNAMICS OF PHASE EQUILIBRIA**
CO1	Understand the thermodynamics of equilibrium
CO2	Study properties from volumetric data and make use of empirical equations to predict fugacity of pure liquid or solid
CO3	Applications of thermodynamics to predict fugacity of liquid mixtures
CO4	Study the intermolecular forces and theories of corresponding states.
Course Name:-	**ELECTIVE - II Process Intensification**
CO1	Apply process intensification in industrial processes
CO2	Implement methodologies for process intensification
CO3	Understand scale up issues in the chemical process.
CO4	Gain the scientific background, techniques and applications of intensification in the process industries.
CO5	Identify and solve process challenges using intensification technologies.
Course Name:-	**COMMUNICATION SKILLS**
CO1	Understand corporate communication culture
CO2	Prepare business reports and proposals expected of a corporate professional
CO3	Employ appropriate speech in formal business situations
CO4	Exhibit corporate social responsibility and ethics
CO5	Acquire corporate email, mobile and telephone etiquette
Course Name:-	**COMPUTATIONAL LAB-I**
CO1	Solve complex chemical engineering problems by applying suitable numerical methods.
CO2	Estimate the thermodynamic properties from implicit equations using C language / MATLAB
CO3	Design the process equipment using C/C++ language /MATLAB
CO4	Analyze and formulate a mathematical problem and solve the resulting system of linear set of equations, ODE, PDE using C/C++ programming/MATLAB.
	F.Y M.Tech Sem-III
Course Name:-	**PROJECT WORK - STAGE I**
CO1	Identify the problem based on literature survey
CO2	Formulate the problem
CO3	Identify the methods or techniques required for the solution

CO4	Develop the solution methodology

CIVIL ENGINEERING

	S.Y. B Tech Part-I Sem-III
Course Name:-	**ENGINEERING MATHEMATICS I**
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
Course Name:-	**MECHANICS OF SOLIDS**
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.
Course Name:-	**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.
Course Name:-	**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.
Course Name:-	**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.
	T.E.PART I SEM V
Course Name:-	**DESIGN OF STEEL STRUCTURES**
CO1	Know the essential elements necessary to analyze steel structures
CO2	Analyze and design different types of bolted and welded connections.
CO3	Understand concept of net area and gross area and demonstrate the knowledge of common sections subjected to tension and its design.
CO4	Analyze and design compression members and design of steel column, column bases and its elements, laterally supported and unsupported beams
CO5	Interpret forces acting on gantry girders.
Course Name:-	**GEOTECHNICAL ENGINEERING – I**
CO1	Understand the index properties of the soil.
CO2	Characterize the soil based on size, shape, index properties of the soil.
CO3	Understand the concept of total stress, effective stress and pore water pressure in soil.
CO4	Understand the process of compaction and consolidation.
CO5	Understand the shear strength of the soil.
CO6	Determine the earth pressure on retaining structures.
Course Name:-	**ENVIRONMENTAL ENGINEERING –I**
CO1	Describe the various sources of water with respect to quality and quantity of water.
CO2	Describe and design the various water treatment units, transmission and distribution of water.
CO3	Illustrate the special water treatments and sequencing of treatment for various qualitiesOf surface & ground water.
CO4	Understand different water supply appurtenances and principles of green building.
Course Name:-	**TRANSPORTATION ENGINEERING I**
CO1	To understand the concept of super-elevation sight distance section of road in cutting and filling.
CO2	To design flexible and rigid pavement as per IRC and quality control for WBM, BBM, and concrete pavements.
CO3	To Design and plan airport, runways terminals buildings, hangers and aprons
CO4	To apply different methods of tunneling in soft and hard rocks and Plan and layout for docks and ports.
Course Name:-	**WATER RESOURCES ENGINEERING –I**
CO1	Apply the knowledge of estimation of hydro meteorological parameters.
CO2	Design of efficient hydraulic structures.
CO3	To develop different methods of efficient irrigation and water conservation.
CO4	To develop the methods of consumptive use of surface water and groundwater.
Course Name:-	**BUILDING PLANNING AND DESIGN**
CO1	To understand the concept of building planning principles.
CO2	To impart basic concepts and various aspects of building planning and architectural compositions.
CO3	To enhance the ability to plan and design complex building structures
CO4	To provide prerequisite knowledge for the advanced courses in building design.

B.E. PART I SEM VII

Course Name:-	**DESIGN OF CONCRETE STRUCTURE I**
CO1	Explain the properties of concrete, steel , behavior of RCC and Design philosophies. Singly and Doubly reinforced beam sections
CO2	Convey the concepts of structural design procedure
CO3	Design the individual members and hence building.
CO4	Analyze and design axially and Eccentrically loaded columns & Isolated rectangular footings.
Course Name:-	**QUANTITY SURVEYING AND VALUATION**
CO1	The students are able to estimate the different components of the structure and learn the art and skill whereby a monetary value can be placed on the volume of work previously measured.
CO2	The students develop awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors.
CO3	The students inculcate the habit of systematically recording all those statistics which are the stock in trade of the good estimator, construction techniques.
CO4	The students inculcate the habit of systematically recording all those statistics which are the stock in trade of the good valuator.
Course Name:-	**PROJECT MANAGEMENT AND CONSTRUCTION EQUIPMENTS**
CO1	Understand the importance of project management tools.
CO2	Plan and Schedule the Project by using CPM, PERT and MSP
CO3	Understand the working of various construction equipment's.
CO4	Know the importance of Safety and Risk Management in Construction.
Course Name:-	**DESIGN OF EARTHQUAKE RESISTING STRUCTURES**
CO1	Prepare mathematical model of structure.
CO2	Illustrate the dynamic behavior of structure.
CO3	Design earthquake resistant structure.

CO4	Know the concept of modern technique.

Course Name:-	ADVANCED STRUCTURAL ANALYSIS
CO1	Know the concept of ILD applied for indeterminate structure.
CO2	Apply appropriate solution techniques to the problems of beams curved in plan.
CO3	Analyze portal frame by using different methods.
CO4	Interpret the output and limitations of different methods.

Course Name:-	REMOTE SENSING APPLICATIONS IN CIVIL ENGINEERING
CO1	Adopt the principles of physics of Electromagnetic radiation as applied to remote sensing.
CO2	Learns the interrelationship of civil, environmental and geological studies.
CO3	Formulate and apply remote sensing and GIS concepts to engineering problems.

	M.Tech Part-I Sem-I
Course Name:-	THEORY OF ELASTICITY AND PLASTICITY
CO1	Understand concept of stress and strain at a point, Stress equilibrium and Strain compatibility and Analyse Stress and Strain at a point with various perspectives, etc. under in three dimensional state of stress.
CO2	Establish relation between stress and strain for various materials, Elastic constants, and reduce 3D problems to 2 D problems.
CO3	Formulate and Analyse stress concentration problems due to various complex situations.
CO4	Formulate and Analyse members subjected to Torsion using various classical approaches.
CO5	Able to understand different post yielding behaviour of materials and Plasticity theories.
CO6	Able to understand various yield criteria, and concept of factor of safety in design of various structural members, concept of Viscoelastic and Viscoplastic materials.

Course Name:-	MATRIX METHODS OF STRUCTURAL ANALYSIS
CO1	Draw deflected shapes of various structures for different loading and boundary conditions.
CO2	Understand difference in force approach and displacement approach in structural analysis.
CO3	Analyze various plane structural systems using direct and generalized flexibility approach.
CO4	Analyze various plane structural systems using direct and generalized stiffness approach.
CO5	Develop codes for computer based analysis of plane structures.
CO6	Understand effect of material non linearity and geometric non linearity on force displacement relation and stiffness matrix.

Course Name:-	STRUCTURAL DYNAMICS
CO1	Understand basics of response of structures to forced vibrations and free vibrations.
CO2	Analyse response of SDoF systems to general loading and understand various methods of evaluation of dynamic response.
CO3	Analyse response of structures to ground excitations, support excitations and torsional excitations.
CO4	Understand and Analyse structures for natural frequency and modal analysis.
CO5	Analyse response of structural system by numerical evaluation using various classical approaches.
CO6	Understand and implement finite element approach in structural dynamics.

Course Name:-	DESIGN OF BRIDGES
CO1	Understand the preliminary concepts, development, various types of bridges and it's conceptual design
CO2	Study various types of loadings coming on road and railway bridges.
CO3	Study the behaviour of various types of bridges under different loadings.
CO4	Design of slab decks of various types of RC and PSC bridges.
CO5	Perform the design of substructure components like piers, abutments, wing walls and it's foundation.
CO6	Study the provision and importance of joints provided in the structure.
CO7	Know the various construction techniques and practices adopted for different bridges and its impact on design.

Course Name:-	ADVANCED PRESTRESSED CONCRETE
CO1	Understand the preliminary concept, terminologies and methodologies related to prestressed concrete.
CO2	Analyse and design of the anchor blocks.
CO3	Analyse the PSC member for flexural, shear strength and deflection.
CO4	Design the simple and indeterminate structures like continuous beams and portal frames.
CO5	Analyse and design composite section and various slabs.
CO6	Design various special types of PSC structures like pipes, poles, tanks, sleepers.
CO7	Understand the causes of various defects in PSC structure and remedies for it.

ELECTRICAL ENGINEERING	
	S.Y. B Tech Part-I Sem-III
Course Name:-	Engineering Mathematics III
CO1	Find Laplace and inverse Laplace transform
CO2	Solve Linear Differential Equations with constant coefficients for solving problems in Mechanical engineering fields
CO3	Represent periodic function as a Fourier series.
CO4	Solve partial differential equation by using variable separable form
CO5	Solve linear differential equation with constant coefficient
CO6	Find differentiation of Vectors, Divergence, Gradient, Curl
Course Name:-	NETWORK ANALYSIS AND SYNTHESIS.
CO1	To review basic components of electric network.
CO2	To design and develop network equations and their solutions.
CO3	To apply Laplace theorem for electric network analyses
CO4	To analyze AC circuit.
Course Name:-	FLUID MECHANICS AND THERMAL ENGINEERING
CO1	To introduce properties of fluid and hydraulic measurement
CO2	To understand dynamics of fluid flow
CO3	To understand basic concepts of IC engines
CO4	To understand concept of refrigeration and air conditioning
Course Name:-	MEASUREMENT AND INSTRUMENTATION
CO1	To understand philosophy of measurement

CO2	To understand different methods analog and digital measurement
CO3	To study principle of construction and operation of different transducer and dismay methods.
Course Name:-	**Basic Human Rights**
CO1	To understand human Rights and Duties
CO2	To understand society, Religion, culture, interrelationship
CO3	To understand individual Liberty, freedom And Democracy
CO4	To understand Indian constitution and Law
Course Name:-	**ENGINEERING ECONOMICS**
CO1	To study concept of time value of money
CO2	To study about demand in detail
CO3	To understand Meaning of Production and factors of production,
CO4	To understand dif. Concept about market
Course Name:-	**ELECTRICAL ENGINEERING MATERIALS**
CO1	To study about crystal structure
CO2	To understand magnetic material structure
CO3	To study about conducting and superconducting materials
CO4	To study dielectric and nano materials.
Course Name:-	**APPLIED PHYSICS**
CO1	Understand concept of Electromagnetic theory and Magnetism
CO2	Understand concept of Dielectric
CO3	Understand concept of Super conductivity
CO4	Understand concept of nanomaterial
Course Name:-	**SIGNALS AND SYSTEMS**
CO1	To study classification of signals and system
CO2	To analyze diff. types of time signal
	T.E PART I SEM V
Course Name:-	**Digital Electronics & Microcontrollers**
CO1	Apply Boolean laws/K-Map-method, Quine Mc-Cluskey method to reduce a given Boolean function.
CO2	Demonstrate The operation of flip-flops, counters and shift registers.
CO3	Understand the internal architecture, pin-out, instruction set, addressing modes and associated circuits of 8051
CO4	Learn Configure the peripherals in 8051 using SFR's, understand the structure of the peripherals and use the peripherals on 8051 for various applications.
CO5	Learn Interface the external peripherals like ADC, DAC, LCD, keyboard etc., to 8051 and using this knowledge form a minimum system to measure temperature using sensors.
Course Name:-	**AC Machines**
CO1	To study construction, operating principle and method of speed control of three phase induction motor
CO2	To study construction and operation of different types of single phase induction motor
CO3	To study construction, operation and voltage regulation methods of three phase alternator
CO4	To study construction and operation of three phase synchronous motor.
Course Name:-	**Power System II**
CO1	Empathize with Representation of Power System in P.U.
CO2	Evaluate Symmetrical fault analysis
CO3	Investigate Sequence Components And To Draw Sequence Network of Different Power System Components.
CO4	Evaluate Unsymmetrical Fault Analysis.
CO5	Recognize Power flow and Network Model Formulation
CO6	Explicate Need of Substation and Substation Layout
Course Name:-	**Control System -II**
CO1	Design a cascade compensator or feedback compensator using root locus to meet transient response and steady state error specifications
CO2	Select the mode of controller according to the types of the system
CO3	Use Bode Plot to design a gain to meet transient response specification for a given system and to design a cascade compensator to meet both transient and steady state error specifications.
CO4	Specify all closed loop poles & then design a state feedback controller to meet transient response specifications of given control system.
CO5	Design an observer to estimates the states
CO6	Differentiate between analog and digital design method of closed loop system
Course Name:-	**Signals& Systems**
CO1	Identify the different types of the signals and system
CO2	Design Continuous and discrete systems using zero state response and zero input response.
CO3	Analyze system using Laplace Transform ,its properties and inverse Laplace transform
CO4	Analyze System using Z- Transform, its properties and inverse z-transform.
CO5	Discuss Fourier analysis of discrete signals.
Course Name:-	**Economics for Engineers**
CO1	Describe micro and macro economics; law of demand &supply.
CO2	Describe the financial system, type of banks and different taxes.
CO3	Concept of financial techniques for business management, Cost & Cost Control, Techniques and capital budgeting.
Course Name:-	**Advanced Switchgear and Protection**
CO1	Describe the different types Circuit Breakers, fuse ,characteristics, terms,phenomenon of circuit
CO2	Remember the types of Relays
CO3	Analyze the types of Over current Protection.
CO4	Evaluate the types of Differential Relays
CO5	Select the types Transformer protection
	State the types of Generator protection
Course Name:-	**Power Quality and Harmonics**
CO1	To empathize with importance of power quality in power system
CO2	To evaluate Total Harmonic Distortion in Power System
CO3	To design harmonic suppression filter

CO4	To discover Mitigation of Voltage Sag and interruptions.
CO5	To discriminate different Harmonic Measurement Techniques.
CO6	To explicate need of Power Quality Monitoring.
Course Name:-	Computer Methods in Power Systems
CO1	Understand presents a comprehensive coverage of graph theory.
CO2	Apply the students in getting basic idea of different computer methods in power systems
CO3	Investigate different Computer Solution Methods Using the Admittance Matrix
CO4	Evaluate Computer techniques for Power flow analysis and numerical techniques to solve load flow problems
CO5	Understand different Simultaneous Faults
CO6	Analyze Simplifications using Two Component Method
Course Name:-	FACTS
CO1	Acquire the knowledge on flexible AC Transmission System, various FACTS controllers operation and its importance for FACTS controllers.
CO2	Evaluate dynamic behaviour of large interconnected networks
CO3	Analyze Optimizing networks with FACT devices
CO4	Design Compensators within realistic constraints
CO5	Identify and solves real network problems with FACTS controllers
M.Tech. I (Electrical Engg.) SEM I	
Course Name:-	POWER SYSTEM MODELING
CO1	Develop power system components modeling and analyze their performance
CO2	Develop modeling of synchronous machine and analyze its performance
CO3	Perform steady state and dynamic analysis on simulation models
CO4	Understand configuration and functioning of synchronous machine excitation system
CO5	Develop excitation system components modeling and analyze their performance
CO6	Understand and transmission line, load and reactive power compensator modeling
Course Name:-	ADVANCED POWER ELECTRONICS
CO1	Understand the behavior of power semiconductor devices operated as power switches.
CO2	analyze operation of various power converters
CO3	Understand advance power conversion techniques
CO4	Apply power conversion technology for exploring RES
CO5	Ability to design and test power electronic circuits in the laboratory
Course Name:-	MODERN CONTROL SYSTEM
CO1	Analyze dynamics of a linear system by State Space Representation. .
CO2	Determine the stability of a linear system using pole-placement technique
CO3	Design state observers.
CO4	Analyze basics of Non-linear control system.
CO5	Determine the stability of Non-linear systems
CO6	Formulate and solve deterministic optimal control problems in terms of performance indices.
Course Name:-	RENEWABLE ENERGY SYSTEM
CO1	Understand current energy scenario and their impact on environment(K1 A1)
CO2	Understand the process of power generation by renewable energy sources(K1 A1)
CO3	Understand configuration of various renewable energy systems (K1 A1)
CO4	Understand various forms of energy storage and their importance (K1 A1)
CO5	Analyze the performance of grid connected system.(K2 A2)
CO6	Understand the various standards and quality issues for grid integration.
Course Name:-	POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS
CO1	Provide knowledge about the stand alone and grid connected renewable energy systems.
CO2	Equip with required skills to derive the criteria for the design of power converters for renewable energy applications.
CO3	Analyze and comprehend the various operating modes of wind electrical generators and solar energy systems.
CO4	Design different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems
CO5	Develop maximum power point tracking algorithms.
Course Name:-	COMMUNICATION SKILLS
CO1	Students are found to be confident while using English
CO2	Engage in analysis of speeches or discourses and several articles
CO3	Identify and control anxiety while delivering speech
CO4	Write appropriate communications(Academic/Business)
CO5	Prepared to take the examinations like GRE/TOFEL/IELTS
CO6	Identify and control the tone while speaking
CO7	Develop the ability to plan and deliver the well-argued presentations
Course Name:-	P.G. LABORATORY –I
CO1	Apply the knowledge to design the practical circuits for applications.
CO2	Model and simulate different electrical and electronics systems
CO3	Simulate and test the circuit performance for comparative study.
	M.Tech. II SEM III
Course Name:-	PROJECT PHASE-I
CO1	Survey literatures of different journals and conference papers
CO2	Model and design proposed work
CO3	Write a comprehensive report of proposed work
ELECTRONICS ENGINEERING	
	S.Y. B Tech Part-I Sem-III
Course Name:-	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, Laplace transform and applications to Communication systems and Signal processing.
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 and integration, analyze the vector fields and apply to Electromagnetic fields.
CO5	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
Course Name:-	**Analog Circuits**
CO1	Understand the characteristics of IC and Op-Amp and identify the internal structure.
CO2	Derive and determine various performances based parameters and their significance for Op-Amp.
CO3	Comply and verify parameters after exciting IC by any stated method.
CO4	Analyze and identify the closed loop stability considerations and I/O limitations.
CO5	Analyze and identify linear and nonlinear applications of Op-Amp.
CO6	Understand and verify results (levels of V & I) with hardware implementation.
CO7	Implement hardwired circuit to test performance and application for what it is being designed.
CO8	Understand and apply the functionalities of PLL.
Course Name:-	**Electronic Devices & Circuits**
CO1	Comply and verify parameters after exciting devices by any stated method.
CO2	Implement circuit and test the performance.
CO3	Analyze small signal model of FET and MOSFET.
CO4	Explain behavior of FET at low frequency.
Course Name:-	**Network Analysis**
CO1	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters.
CO3	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society.
Course Name:-	**Basic Human Rights**
CO1	Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights.
CO2	Strengthen the respect for human rights and fundamental freedoms.
CO3	Enable all persons to participate effectively in a free society.
CO4	Learn about human rights principles, such as the universality, indivisibility, and interdependence of human rights.
CO5	Learn about regional, national, state, and local law that reinforces international human rights law.
CO6	Learn and know about being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights.

T.E PART I SEM V

Course Name:-	**Signals & Systems**
CO1	Perform different types of operations on CT and DT signals & compute the response of LTI systems.
CO2	Select appropriate sampling rate for discretization of CT signals.
CO3	Perform time and frequency domain analysis by using Fourier & Z-Transforms.
CO4	Realize the system using different structures.
Course Name:-	**MICROCONTROLLERS**
CO1	Understand difference between Microprocessor and Microcontroller
CO2	Understand the microcontroller's family and its architecture
CO3	Write an effective program for microcontrollers using assembly language
CO4	To design and implement interface between digital and analog interface to electronic devices and integrated circuits for real world
CO5	Students will able to design small microcontroller based systems
Course Name:-	**ELECTROMAGNETIC ENGINEERING**
CO1	Solve the problems on Force, field intensity, Density and potentials for Electromagnetic Fields
CO2	Explain Maxwell's equations and wave equations of Electromagnetic waves
CO3	Analyze Electromagnetic wave and transmission lines
CO4	Recognize the need and ability to engage in lifelong learning in getting self employment
Course Name:-	**VLSI Design**
CO1	Use VHDL for implementation of combinational and sequential logic as well as to simulate it.
CO2	Design digital systems using structural style of modeling
CO3	Design & develop different finite state machines for specific tasks such as Datapath (DP) and Control Unit (CU) of GPP
CO4	Understand and demonstrate the programmable logic devices structures and testing techniques used in VLSI
Course Name:-	**DIGITAL COMMUNICATION**
CO1	Solve problems based on probability theory
CO2	Analyze the performance of various source coding techniques and Demonstrate data formats
CO3	Identify band pass modulation schemes and compute performance of these techniques.
CO4	Explain need of synchronization and concept of optimum receiver and equalizer
Course Name:-	**PROGRAMMING LAB –II**
CO1	Students will be understand variables, array , sub array & debugging MATLAB program.
CO2	Students will be able to use loop statements to solving the problems.
CO3	Students will write function files & able to open a data file in read, write mode.
CO4	Students will understand MATLAB graphics system .
CO5	Students will model and simulate the system using Simulink.

B.E. PART I SEM VII

Course Name:-	**INFORMATION THEORY & CODING**
CO1	Determine information content, entropies and information rate.
CO2	Formulate the channel models mathematically and calculate channel capacity of various types of channels.
CO3	Design encoder and decoder for various coding techniques to analyze the error detecting and correcting capability of coding scheme
Course Name:-	**EMBEDDED SYSTEM DESIGN**
CO1	Differentiate and apply important attributes of Embedded system
CO2	Use ARM programmers model to encode instructions so as to write meaningful assembly language program, compile, execute and debug it
CO3	Student should be able to design small applications of UART, I2C, SPI

CO4	Demonstrate scaling of execution speed using MAM and PLL, Saving device power	
CO5	Student should be able to design small applications of GPIO, Timers, PWM, Real time clock, Watchdog using embedded C	
CO6	Design Embedded system applications using RTOS	
Course Name:-	COMPUTER NETWORK	
CO1	State the evolution of computer network , classifies different types of computer network	
CO2	Design ,implement,and analyze simple computer network	
CO3	Identify,formulate and solve network engineering problems .	
CO4	Understanding of basic network security	
Course Name:-	IMAGE PROCESSING	
CO1	Apply Principles and techniques of digital image processing in applications related to digital imaging system design and analysis.	
CO2	Analyze and implement image processing algorithms.	
CO3	Hands on experience in using software tools for processing digital Images	
Course Name:-	SATELLITE COMMUNICATION	
CO1	Understand basic concepts of satellite communication.	
CO2	Understand orbital mechanics, launch vehicles and satellite subsystems.	
CO3	Calculate satellite link budget.	
CO4	Define V-SAT system.	
CO5	Understand satellite navigation and GPS	
	M.Tech Part-I Sem-I	
Course Name:-	Computational Methods	
CO1	Learner will be able to design programs which numerically compute derivatives and integrals of functions which model physical systems	
CO2	Learner will be able to design programs incorporating loops in Matlab and C++ which numerically solve a plurality of problems using different methods	
CO3	Learner will be able to design programs incorporating loops in Matlab and C++ which numerically solve a plurality of differential equations and integral equations	
CO4	Learner will be able to solve Integration and Integral Equations	
CO5	Learner will be able to solve ODE	
CO6	Learner will be able to solve Partial Differential Equation	
Course Name:-	Microelectronics	
CO1	Learner will be able to discuss MOS structure in terms of different parameters	
CO2	Learner will be able to express different CMOS technologies	
CO3	Learner will get knowledge of design rules for the CMOS design	
CO4	Learner will be able to understand how devices and integrated circuits are fabricated and describe discuss modern trends in the microelectronics industry	
CO5	Learner will be able to determine the frequency range of simple electronic circuits and understand the high frequency limitations of BJTs and MOSFETs	
CO6	Learner will be able to design simple devices and circuits to meet stated operating specifications	
Course Name:-	VLSI System Design	
CO1	Learner will be able to understand the concepts of and electrical properties of MOS technologies	
CO2	Learner will be able to understand different types layout designing tools and floor planning methods used in chip design	
CO3	Learner will be able to design layout using simple gates	
CO4	Learner will be able to design combinational logic networks and sequential systems	
CO5	Learner will be able to understand CAD algorithms used in chip design	
CO6	Learner will be able to analyse various CAD tools for Layout synthesis and Analysis	
Course Name:-	Artificial neural networks and applications: Elective-I	
CO1	Learner will be able to articulate analogy of human neural network for understanding of artificial learning algorithms.	
CO2	Learner will be able to analyze radial basis function network.	
CO3	Learner will be able to analyze neural network architecture & basic learning algorithms.	
CO4	Learner will be able to understand mathematical modeling of neurons, neural networks.	
CO5	Learner will be able to analyze training, verification and validation of neural network models	
CO6	Learner will be able to design Engineering applications that can learn using neural networks	
Course Name:-	Embedded system Design: Elective-II	
CO1	Learner will have understanding of fundamental embedded systems design paradigms, architectures, possibilities and challenges, both with respect to software and hardware	
CO2	Learner will be able to analyze a wide competence from different areas of technology, especially from computer engineering, study of processor for deep understanding analyze case study of Pentium processor	
CO3	Learner will be able to demonstrate architecture of processors, Instruction set, Addressing modes. Programming for various applications. Interfacing of LED/LCD, keyboard, stepper motor, ADC/DAC and sensors, RTC, serial communication with micro-contr	
CO4	Learner will be able to analyze deep state-of-the-art theoretical knowledge in the areas of real-time systems, artificial intelligence, learning systems, sensor and measuring systems, and their interdisciplinary nature needed for integrated hardware/softwar	
CO5	Learner will be able to analyze a system both as whole and in the included parts, to understand how these parts interact in the functionality and properties of the system.	
CO6	Learner will be able to understand and experience of state-of-the-practice industrial embedded systems and intelligent embedded system development.	
Course Name:-	Communication Skills	
CO1	Learner will be able to understand the fundamental principles of effective business communication	
CO2	Learner will be able to apply the critical and creative thinking abilities necessary for effective communication in today's business world	
CO3	Learner will be able to organize and express ideas in writing and speaking to produce messages suitably tailored for the topic, objective, audience, communication medium and context	
CO4	Learner will be able to demonstrate clarity, precision, conciseness and coherence in your use of language	
CO5	Learner will be able to become more effective confident speakers and deliver persuasive presentations	
	M.Tech Part-II Sem-I	
Course Name:-	Project Stage-I	

CO1	To make student aware of recent trends in Electronics and Telecommunication
CO2	Student understand and Exhibits different phases of project Development.
CO3	Implement software and / or hardware model of proposed work
CO4	Perform analysis in detail of the proposed work
CO5	Student will be able to demonstrate soft skill like working in team, documentation and presentation.

ELECTRONICS & TELECOMMUNICATION ENGINEERING

	S.Y. B Tech Part-I Sem-III
Course Name:-	**Engineering Mathematics-III**
CO1	Solve higher order linear differential equation using appropriate techniques for modeling andanalyzing electrical circuits.
CO2	Solve problems related to Fourier transform, Z-transform and applications to Communicationsystems and Signal processing.
CO3	Obtain Interpolating polynomials, numerically differentiate and integrate functions,
CO4	numerical solutions of differential equations using single step and multi-step iterativemethods used in modern scientific computing.
CO5	Perform vector differentiation and integration, analyze the vector fields and apply to ElectroMagneticfields.
CO6	Analyze conformal mappings, transformations and perform contour integration of complexfunctions in the study of electrostatics and signal processing.
Course Name:-	**Analog Circuits**
CO1	Understand the characteristics of IC and Op-Amp and identify the internal structure.
CO2	Derive and determine various performances based parameters and their significance for Op-Amp.
CO3	Comply and verify parameters after exciting IC by any stated method.
CO4	Analyze and identify the closed loop stability considerations and I/O limitations.
CO5	Analyze and identify linear and nonlinear applications of Op-Amp.
CO6	Understand and verify results (levels of V & I) with hardware implementation.
CO7	Implement hardwired circuit to test performance and application for what it is being designed.
CO8	Understand and apply the functionalities of PLL.
Course Name:-	**Electronic Devices & Circuits**
CO1	Comply and verify parameters after exciting devices by any stated method.
CO2	Implement circuit and test the performance.
CO3	Analyze small signal model of FET and MOSFET.
CO4	Explain behavior of FET at low frequency.
CO5	Design an adjustable voltage regulator circuits.
Course Name:-	**Network Analysis**
CO1	Apply knowledge of mathematics to solve numerical based on network simplification and it will be used to analyze the same.
CO2	Design passive filters and attenuators theoretically and practically. To apply knowledge for design of active filters as well as digital filters and even extend this to advance adaptive filters.
CO3	Identify issues related to transmission of signals, analyze different RLC networks.
CO4	Find technology recognition for the benefit of the society.
Course Name:-	**Digital Logic Design**
CO1	Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
CO2	Design combinational and sequential circuits.
CO3	Design and implement hardware circuit to test performance and application.
CO4	Understand the architecture and use of VHDL for basic operations and Simulate using simulation software.
Course Name:-	**Basic Human Rights**
CO1	Simply put, human rights education is all learning that develops the knowledge, skills, and values of human rights Strengthen the respect for human rights and fundamental freedoms.
CO2	Enable all persons to participate effectively in a free society.
CO3	Learn about human rights principles, such as the universality, indivisibility, and interdependence of human rights.
CO4	Learn about regional, national, state, and local law that reinforces international human rights law.
CO5	Learn and know about and being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights.

T.E PART I SEM V

Course Name:-	**Antenna and wave propogation**
CO1	Realize the importance of basics of antenna systems to differentiate the applicability of each type of antenna.
CO2	Analyze the utilization of Antenna systems in wide areas like wireless communication, fixed line communication, computer communication.
CO3	Solve various problems on various parameters of antennas
Course Name:-	**Control System**
CO1	Apply knowledge of mathematics, science and engineering to design, analyze and control the different systems.
CO2	Explain time and frequency domain analysis for different control systems.
CO3	Demonstrate and compare different control systems.
CO4	Describe state variables.
CO5	Design control system model
Course Name:-	**Signals and Systems**
CO1	Define CT signals mathematically & solve problems related to operations on signals.
CO2	Classify different systems & learn its properties.
CO3	Understand Fourier series & Transforms and represent different signals using these techniques.
CO4	Apply different tools like Z, Fourier Transform to analyze the systems.
CO5	Understand & gain the knowledge of sampling process
Course Name:-	**Power Electronics**
CO1	Understand power electronics DC Drives, devices and its firing circuits.
CO2	Analyze the allied applications of Power Electronics.
CO3	Describe the PLC/SCADA and other miscelleneous applications
Course Name:-	**Digital Communication**
CO1	Realize and solve the problems related to random signals and also the related issues like power spectral density.
CO2	Work with the information availability and code the information in different formats.
CO3	Acquire knowledge of different source coding techniques available with their pros and cons.
CO4	Understand the baseband transmission with optimal receiver operation and working.
CO5	Describe the channel coding techniques with error handling methods.
Course Name:-	**Simulation Lab**

CO1	Use the different commands, functions required for programming in MATLAB.
CO2	Calculate and perform various operations using MATLAB.
CO3	Analyze and simulate the various systems.

B.E. PART I SEM VII

Course Name:-	Computer Communication Networks
CO1	Students will be able to Explain different types of networks and network topologies
CO2	Students will be able to describe use of different network devices.
CO3	Students will be able to describe different layers in reference model.
CO4	Students will be able to Explain TCP/IP protocol and other networking protocols.

Course Name:-	Embedded Systems
CO1	Students will be able to explain the architectural details of ARM processors.
CO2	Students will be able to write assembly language codes for programming the embedded processors.
CO3	Students will be able to demonstrate some embedded circuit designs using appropriate communication standard.
CO4	Students will be able to use the knowledge of embedded processors & RTOS for building real life projects.

Course Name:-	Satellite Communication (Elective –I)
CO1	Students will be able to explain the basic Orbital mechanics for Satellite communication and the satellite systems.
CO2	Students will be able to design the satellite links and describe the VSAT system in detail.
CO3	Students will be able to describe the multiple access system and also LEO and Non-Geostationary satellite system.
CO4	Students will be able to apply the knowledge of direct broadcast satellite TV & radio also the satellite navigation & the GPS.

Course Name:-	Seminar And Project
CO1	Students will be able to explain the recent trends in electronics & telecommunication
CO2	Students will be able to improve communication skills
CO3	Students will be able to apply different phases of project development.
CO4	Students will be able to demonstrate soft skills like working in team, documentation and presentation.

Course Name:-	Microwave Engineering
CO1	Students will be able to differentiate Rectangular & Circular waveguide.
CO2	Students will learn the operational characteristics of microwave components & devices through experimentation with them.
CO3	Students will be able to determine circuit properties of passive/active microwave devices.
CO4	Students will be able to perform a variety of microwave measurements.

Course Name:-	RF & Microwave Engineering
CO1	Explain the different types modes propagation in waveguides
CO2	Select the appropriate component for various applications.
CO3	Measure the various microwave parameters.
CO4	Explain the different microwave Hazards.
CO5	Demonstrate the application of Microwave Engineering to various fields.

Course Name:-	Robotics (Elective I)
CO1	Student can understand basics concept of industrial atomization & Robotic technology
CO2	Students can able to select different sensors, electronics systems for Robot
CO3	Student can develop software for particular robotic applications
CO4	Students will understand robot applications & develop robot for particular applications

Course Name:-	Speech Processing
CO1	Understand acoustic theory
CO2	Distinguish time domain modules
CO3	Analyze and distinguish different modulation techniques
CO4	Analyze and synthesizespeech using STFT ,homomorphic processing .

Course Name:-	Micro Electro Mechanical Systems and Systems on chip (Elective I)
CO1	Apply knowledge of mathematics, science, and engineering to design MEMS small systems.
CO2	Explain basic fabrication steps of fabrication
CO3	Explain the integration and packaging if MEMS

Course Name:-	Radar & Navigation Aids (Elective-I)
CO1	Acquired knowledge about radar and radar equation
CO2	Understanding the working principal of Doppler radar
CO3	Ability to work for measurement and tracking signal
CO4	Foster ability to work instrument landing system

	M.Tech Part-I Sem-I
Course Name:-	SIGNAL THEORY
CO1	Learner will be able to apply knowledge of basic probability theory.
CO2	Learner will be able to understand concept of Random Variable.
CO3	Learner will be able to estimate different aspects of Random Variable like Mean,
CO4	Variance, Moments , distribution function, density function etc.
CO5	Learner will be able to distinguish multiple Random Variable and its properties..
CO6	Learner will be able to hypothesize nature of different Random Processes.
CO7	Learner will be able to adapt basic concepts of estimation on multiple and repeated
CO8	Data measurement.

Course Name:-	RADIATION AND MICROWAVE TECHNIQUES
CO1	Learner will be able to analyze EM Transmission characteristics of waveguide

CO2	Learner will be able to analyze Transmission line circuit at microwave frequency
CO3	Learner will be able to demonstrate use of smith chart for solving transmission line problem.
CO4	Learner will be able to analyze various microstrip line integrated networks and their parameters
CO5	Learner will be able to formulate microwave communication system such as satellite and microwave antennas
CO6	Learner will be able to demonstrate different applications of RF and Microwave
Course Name:-	**SIGNAL PROCESSING ALGORITHMS AND APPLICATIONS**
CO1	Learner will be able to analyze the time and frequency response of discrete time system.
CO2	Learner will be able to design digital filters for various application .
CO3	Learner will be able to design FIR and IIR filters for various applications
CO4	Learner will be able to understand the fundamentals of multi rate signal processing and its application
CO5	Learner will be able to understand signal representation in terms of dimension, orthogonality etc.
CO6	Learner will be able to analyze least square method for power spectrum estimation
Course Name:-	**MOBILE COMMUNICATION**
CO1	Learner will be able to analyze concept of basic cellular mobile system
CO2	Learner will be able to analyze multipath fading channel.
CO3	Learner will be able to distinguish types of fading channels with the concept of coherence time
CO4	Learner will be able to demonstrate the multiple access techniques.
CO5	Learner will be able to analyze diversity in multipath channels
CO6	Learner will be able to understand the various standards involve in evolution of communication system
Course Name:-	**OPTICAL FIBER COMMUNICATION**
CO1	Learner will be able to recognize and classify the structures of Optical fiber and types.
CO2	Learner will be able to demonstrate electromagnetic and mathematical analysis of light wave propagation.
CO3	Learner will be able to analyze fabrication techniques of different optical fibers.
CO4	Learner will be able to interpret behavior of pulse signal and various loss mechanism.
CO5	Learner will be able to interpret Dispersion compensation mechanism, Scattering effects and modulation techniques.
CO6	Learner will be able to interpret working of Fiber based devices.
Course Name:-	**COMMUNICATION SKILLS**
CO1	Learner will be able to understand the fundamental principles of effective business communication
CO2	Learner will be able to apply the critical and creative thinking abilities necessary for effective communication in today's business world
CO3	Learner will be able to organize and express ideas in writing and speaking to produce messages suitably tailored for the topic, objective, audience, communication medium and context
CO4	Learner will be able to demonstrate clarity, precision, conciseness and coherence in your use of language
CO5	Learner will be able to become more effective confident speakers and deliver persuasive presentations
ELECTRONICS & TELECOMMUNICATION	
	M.Tech Part-II Sem-I
Course Name:-	**Project Stage-I**
CO1	To make student aware of recent trends in Electronics and Telecommunication
CO2	Student understand and Exhibits different phases of project Development.
CO3	Implement software and / or hardware model of proposed work
CO4	Perform analysis in detail of the proposed work
CO5	Student will be able to demonstrate soft skill like working in team, documentation and presentation.
INFORMATION TECHNOLOGY Engineering	
	S.Y. B Tech Part-I Sem-III
Course Name:-	**Engineering Mathematics-III**
CO1	Comprehen the fundamental knowledge of Laplace Transform.
CO2	Apply the properties of Laplace and inverse Laplace Transform to solve simultaneous linear differential equation with constant coefficient.
CO3	Understand the definition and properties of Fourier Transfor
CO4	Solve Partial differential equation and it's applications.
CO5	Evaluate complex differentiation useful in real world problem.
CO6	Find integration of complex function by using Cauchy integral formula.
Course Name:-	**Switching Theory and Logic Design**
CO1	Illustrate theory of Boolean algebra and the underlying features of various numbering systems
CO2	Design various combinational & sequential logic circuits.
CO3	Demonstrate working of flip-flop.
Course Name:-	**Object Oriented Paradigm with C++**
CO1	Draw the control flow of a program.
CO2	Understand the storage concepts in a simple program.
CO3	Program using basic concepts of OO languages i.e. objects, encapsulation, data hiding etc.
CO4	Program using advanced concepts of OO languages i.e. associations, packages, interfaces,
CO5	exception handling etc.
Course Name:-	**Computer Architecture and Organization**
CO1	To identify components of a computer system, including CPU, memory, and input/output units.
CO2	To explain instruction types, its execution and interrupt mechanism.
CO3	To illustrate numerical and character representations in digital logic and floating point
Course Name:-	**Programming in Java**
CO1	Know the structure and model of the Java programming language.
CO2	Use the Java programming language for various programming technologies.
CO3	Develop software in the Java programming language (application).
Course Name:-	**Basic Human Rights**
CO1	Appreciate the importance of the values of human rights.
CO2	Strengthen respect for human rights and fundamental freedoms and respect others caste, religion, region and culture.

CO3	Know about regional, national, state, and local law that reinforces international human rights law.
CO4	Understand being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights.
CO5	Be aware of rights as Indian citizen.
CO6	Understand the importance of groups and communities in the society.
CO7	Realize the philosophical and cultural basis and historical perspectives of human rights.
CO8	Make students aware of their responsibilities towards the nation.

T.E PART I SEM V

Course Name:-	OPERATING SYSTEM-I
CO1	Understand and learn operating systems, types and its use.
CO2	Understand and learn process, threads and their management.
CO3	Understand and learn process and Thread scheduling, inter process synchronization and communication.
CO4	Understand and learn memory management concept.
CO5	Understand and learn input output devices & their management.

Course Name:-	Database Engineering
CO1	To Draw the entity relationship diagram for a problem.
CO2	To Understand central ideas of database administration.
CO3	To Use Standard Query Language and it's various versions.
CO4	To Apply normalization techniques on given database.
CO5	To Work with database connectivity using JDBC-ODBC

Course Name:-	Computer Algorithms
CO1	Argue the correctness of algorithms using inductive proofs and invariants.
CO2	Analyze worst-case running times of algorithms using asymptotic analysis.
CO3	Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms.
CO4	Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
CO5	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
CO6	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
CO7	Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
CO8	Describe the Backtracking paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize Backtracking algorithms, and analyze them.
CO9	Differentiate between P and NP problems.

Course Name:-	System Programming
CO1	To explain various language processing activities
CO2	To understand language processing activities & differentiate between them
CO3	To describe the various concept of assemblers and microprocessors.
CO4	To understand the various phases of complier and compare its working with assembler
CO5	To understand the basics of system programming like editors, compiler, assembler, linker, loader & interpreter.
CO6	To know various open source software.

Course Name:-	Object oriented modeling and design
CO1	Possess an ability to practically apply knowledge of object oriented analysis with clear emphasis on UML.
CO2	Design static and dynamic modelling on given problem statement.
CO3	Identify and formulate problems in software development.
CO4	To provide Knowledge about design methodology

Course Name:-	Application Development Tool –I
CO1	Student will be able to implement command line arguments, classes
CO2	Students are able to handle OOP's concepts.
CO3	Students are able to implement I/O and Exception handling.
CO4	Students will get the knowledge of AWT, Swing and Event handling.

B.E. PART I SEM VII

Course Name:-	Project Management
CO1	To describe fundamental concept of project management
CO2	To explain different knowledge areas
CO3	To identify processes in the knowledge areas and there inter dependencies
CO4	To identify documents required for actual projects and describe the time needed to successfully complete a project
CO5	To know commonly used tools and techniques for project management

Course Name:-	Mobile Computing
CO1	To Analyze the specialized MAC describing the performance of wireless transmission.
CO2	To Solve security issues of Telecommunications systems using GSM.
CO3	To Differentiate between SDMA, FDMA,TDMA & CDMA.
CO4	To Understand and analyze Mobile IP, DHCP and improvement in Classical TCP.

Course Name:-	Advanced Database System
CO1	Student should be able to realize query optimization and cost estimation.
CO2	Differentiate database systems by enumerating the features provided by database systems and describe each in both function and benefit.
CO3	Understand and analyze the concept of data warehousing.
CO4	Demonstrate the concept of data mining and web mining

Course Name:-	Internet of Things
CO1	To Understand basic knowledge of RFID, sensor and GPS technologies
CO2	To be familiar with Internet of Things Technology
CO3	To analyze and use wireless technologies and IoT applications.

Course Name:-	Web Technology-I
CO1	Students will able to understand differences in desktop and web applications using different techniques in java
CO2	Students will able to understand xml technologies , parsing & validation techniques
CO3	Students will able to understand emerging web technologies concepts & tools
CO4	Student will able to understand different java techniques like JSP and SERVLET to develop web application
CO5	Student will able to develop real life web applications using advanced java technology & XML technology.

Course Name:-	Mobile Application Development
CO1	Study about the android architecture and the tools for developing android Applications.
CO2	Create an android application.
CO3	Learn about the user interfaces used in android applications.
CO4	Learn about deployment of android application.

INSTRUMENTATION ENGINEERING

	S.Y. B Tech Part-I Sem-III
Course Name:-	Engineering Mathematics-III
CO1	Comprehend the fundamental knowledge of Laplace Transform.
CO2	Apply the properties of Laplace and inverse Laplace Transform to solve simultaneous linear differential equation with constant coefficient.
CO3	Understand the definition and properties of Fourier Transfor
CO4	Solve Partial differential equation and it's applications.
CO5	Evaluate complex differentiation useful in real world problem.
CO6	Find integration of complex function by using Cauchy integral formula.
Course Name:-	Sensor & Transducer
CO1	To exposes the students to various sensors and transducers for measuring mechanical quantities.
CO2	To understand the specifications of sensors and transducers.
CO3	To learn the basic conditioning circuits for various sensors and transducers.
CO4	To introduce advances in sensor technology.
Course Name:-	Network Analysis & Synthesis
CO1	To review basic components of electric network.
CO2	To design and develop network equations and their solutions.
CO3	To apply Laplace theorem for electric network analyses
CO4	To analyze AC circuit.
Course Name:-	Analog Electronics
CO1	Analyze transistor circuit using h parameter model.
CO2	Design and analyze different op-amp circuits for various applications.
CO3	Describe characteristics of various power devices and power converters.
Course Name:-	Elective-I (Production Process & Metrology)
CO1	To familiarized with different production process and metrology
CO2	To study different production process.
CO3	To understand metrology of different materials
Course Name:-	Basic Human Rights
CO1	To study concept of time value of money
CO2	To study about demand in detail
CO3	To understand Meaning of Production and factors of production,
CO4	To understand dif. Concept about market

Course Name:-	Applied Biology
CO1	To introduce recent trends in biology viz. genetic& tissue engineering, stem cell engineering, bio and nanotechnology etc. with the objective of appreciating engineering principles in biological systems

	T.E. Part-I Sem-V
Course Name:-	Power Electronics
CO1	Student will able to describe power SCR, MOSFET, IGBT, Diac, Triac.
CO2	Student will able to explain phase controlled rectifiers.
CO3	Student will demonstrate Choppers and Inverters.
CO4	Student will able to design DC motor and AC motor control scheme.
CO5	Student will able to analyze cycloconverters.

Course Name:-	Process Control
CO1	Student will able to describe different process characteristics.
CO2	Student will able to explain PID controller.
CO3	Student will able to evaluate PID tuning methods
CO4	Student will able to illustrate multivariable control system.
CO5	Student will able to describe control valve.

Course Name:-	Biomedical Instrumentation
CO1	Students will able to describe human anatomy & physiological systems.
CO2	Students will able to distinguish recording and monitoring instruments.
CO3	Students will able to design of bio potential amplifier.
CO4	Student will able to illustrate instruments used in clinic.
CO5	Students will able to collect safety & recent development in biomedical field.

Course Name:-	Automatic Control System
CO1	Student will able to describe basic components of feedback control system.
CO2	Student will able to design mathematical model of system.
CO3	Student will able to evaluate time domain & frequency domain analysis.
CO4	Student will explain stability criteria of system.

Course Name:-	Microcontroller & Application
CO1	Student will able to explain architecture of microcontroller.
CO2	Student will able to develop assembly language programming.
CO3	Student will able to function interfacing of hardware with microcontroller.

CO4	Student will develop interfacing of protocols with microcontroller.
B.E. PART I SEM VII	
Course Name:-	**Virtual Instrumentation**
CO1	Student will able to explain basics of virtual instrumentation.
CO2	Students will able to do programming.
CO3	Student will able to know data acquisition.
CO4	Students will able to do analysis of Fourier transforms correlation methods, windowing & filtering.
Course Name:-	**Process Modeling & Simulation**
CO1	Students will able to explain dynamics of process.
CO2	Student will able to formulate model of certain system.
CO3	Student will able to identify unknown parameters of process.
CO4	Students will able to know optimization techniques.
CO5	Students will able to describe basic simulation.
Course Name:-	**Digital Signal Processing**
CO1	Define CT signals mathematically & solve problems related to operations on signals
CO2	To apply different tools like Z-transform, Fourier Transform to analyze the systems.
CO3	Student will able to design digital FIR & IIR filters.
CO4	Students will able to know applications of DSP.
Course Name:-	**Process Equipment Design**
CO1	Students will able to various standards for calibration & testing.
CO2	Students will able to design considerations of process as well as trouble shooting & maintenance.
CO3	Students will able to know PCB technology.
CO4	Students will able to design PID controller & signal conditioning.
Course Name:-	**Project Work Phase I & Seminar**
CO1	Student will know latest techniques in instrumentation engineering.
CO2	Student will able to explain technology in detail.
CO3	Students' technical knowledge would be developed.
CO4	Student will able to organize the talk.
CO5	Student will able to develop presentation skills.
Course Name:-	**Industrial Training**
CO1	Student will able to adapt readily to real life working environment and practice the right work attitude.
CO2	Student will able to apply knowledge learnt, gain new skills and be aware of current technologies.
CO3	Student will able to provide opportunities for organization to assess them as prospective employees
CO4	Student will able to explain industrial problems and suggest possible solutions.
CO5	Student will able to present a proper report, both orally and in writing on their work experience
Course Name:-	**Building Automation**
CO1	Describe alarm system
CO2	know security system
CO3	Identify processes in HVAC
CO4	Explain Energy management systems
MECHANICAL ENGINEERING	
	S.Y. B Tech Part-I Sem-III
Course Name:-	**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
Course Name:-	**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
Course Name:-	**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
Course Name:-	**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
	T.E. Part-I Sem-V
Course Name:-	**Control Engineering**
CO1	Understand control system, its type and applications.
CO2	Understand mathematical model of simple physical systems.
CO3	Determine system stability and system response.
CO4	Use MATLAB software to analyse control system
Course Name:-	**Theory of Machine -II**
CO1	Identify the various types of gears ans select a suitable gear train for practical purpose.
CO2	Analyze gyroscopic effects for various applications.
CO3	Make force analysis of different mechanisms.
CO4	Analyze and solve practical balancing problems.
CO5	Suggest a suitable flywheel for practical applications
Course Name:-	**Heat and Mass Transfer**
CO1	Understand the basic modes of heat transfer.
CO2	Compute temperature distribution in steady-state and unsteady-state heat conduction.
CO3	Understand and analyze heat transfer through extended surfaces.
CO4	Interpret and analyze forced and free convection heat transfer.
CO5	Understand the principles of radiation heat transfer and basics of mass transfer.
CO6	Design heat exchangers using LMTD and NTU methods.
Course Name:-	**Machine Design - I**
CO1	Apply basic principles of machine design.
CO2	Design machine elements like shaft, key, various types of joints, couplings etc.
CO3	Design or select elements like keys, nuts & bolts, Screw threads, Spring Pulley from Design data books and standard practices.
CO4	Select belts (Flat/V belt/ Round) machine elements from Manufacturer's catalogue.
Course Name:-	**Manufacturing Engineering**
CO1	Identify parameters of single and multipoint cutting tools.
CO2	Design jigs and fixtures.
CO3	Understand the working of single spindle automat, tool layout and cam design.
CO4	Design dies for press working operations.
CO5	Understand working of CNC machines.
Course Name:-	**CAD/CAM Laboratory**
CO1	Create constrained 2D Sketches and solid models of machine component
CO2	Apply appropriate command to construct solid model
CO3	Create Assembly Model
CO4	Prepare Part Programs
Course Name:-	**Professional Skill Development**
CO1	Strengthen technical and soft skills necessary for workplace success
CO2	increase awareness of marketability on the job market and confidence in abilities
CO3	Effectively make the transition from school to the workplace
CO4	Manage their career by navigating through the working world more effectively
Course Name:-	**Workshop Practice - V**
CO1	Select the suitable machining operations and prepare process sheet to manufacture a component and implement the same.
CO2	Control key dimensions on a component using principles of metrology and assembly
Course Name:-	**Mini-Project- I**
CO1	Work in a group on specific assignment.
CO2	Think creatively to come out with feasible solution for engineering real life problem.
CO3	Enculcate habit of life long learning
B.E. Part-I Sem-VII	
Course Name:-	**Refrigeration & Air Conditioning**
CO1	Understand the principles and applications of refrigeration systems
CO2	Understand vapour compression refrigeration system and identify methods for performance improvement
CO3	Understand the working principles of air, vapour absorption & non conventional methods of refrigeration
CO4	Analyze air-conditioning processes using the principles of psychrometry.
CO5	Evaluate cooling and heating loads and understand the importance of air distribution, duct design in air conditioning systems.
Course Name:-	**Mechanical System Design**
CO1	Incorporate ergonomic, aesthetic and creativity aspects in product design
CO2	Analyze and Design different systems such as Pressure vessel, Brakes, Clutches, Machine tool Gear box and I. C. Engine Components etc
CO3	Optimize design of various components/systems in mechanical engineering
CO4	Use IS Codes, Design data books, Handbooks required for system design.
CO5	Incorporate aesthetic, ergonomic and creativity considerations in industrial product design
Course Name:-	**Finite Elements Method**
CO1	Elaborate the fundamental concepts, equations of equilibrium, Stress-strain relations and the principle of minimum potential energy
CO2	To implement finite element methods for simple 1-D problems by hand calculation.
CO3	Apply the finite element formulations for two dimensional plane stress, plane strain and axisymmetric problems.

CO4	Use commercial software package to solve simple structural and heat transfer problems.
Course Name:-	**Elective I-Automobile Engineering**
CO1	Explain components of automobile
CO2	Distinguish various types of automobile lay outs as per drive given to wheels & identify types of automobile bodies and materials used for the same.
CO3	Demonstrate various automobile systems like clutch, gearbox final drive, brake, steering, suspension wheels and tyres, and its construction and working
CO4	Demonstrate various electrical and electronic systems like lighting, starting charging electronic controlled management system and its construction and working principle, sensors used in automobile
CO5	Solve the problems related with various resistances for the automobile, engine power calculation.
Course Name:-	**Elective II-Total Quality Management**
CO1	Understand importance of assuring quality in the service or manufacturing sector and explain Quality assurance system
CO2	Understand vendor rating and select suitable vendor
CO3	Calculate reliability of system
CO4	Interpret various quality attributes, Comment on quality using Taguchi Philosophy and discuss the various quality approaches
CO5	Identify and solve the quality related problems in manufacturing or service sector at various stages by using various TQM tools and techniques
Course Name:-	**Project Phase-I**
CO1	Improve the professional competency and research aptitude in relevant area
CO2	Develop the work practice to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research.
	M.Tech Part-I Sem-I
	Thermal Engineering
Course Name:-	**Advanced Thermodynamics**
CO1	Understand properties of pure substances. Represent various processes with steam on property diagrams, Apply and compare equations of state for real gases
CO2	Derive Maxwell Relations, Clapeyrons Equation etc. and apply these for evaluation of thermodynamic properties.
CO3	Evaluate entropy change for flow and non-flow processes under steady and unsteady conditions.
CO4	Estimate thermodynamic properties of substances in gas or liquid state of ideal and real mixture.
CO5	Predict intermolecular potential and excess property behavior of multi-component systems. Study irreversible processes.
Course Name:-	**Advanced Heat Transfer**
CO1	Analyze steady state and transient heat conduction problems of real life Thermal systems
CO2	Analyze extended surface heat transfer problems and problems of phase change heat transfer like boiling and condensation
CO3	Apply the basic principles of classical heat transfer in real engineering application
CO4	Analyze the analytical and numerical solutions for heat transfer problem.
CO5	Understand the basic concepts of turbulence and their impact on heat transfer
CO6	Analyze radiation heat transfer problems of various thermal systems
Course Name:-	**Numerical Methods & Computational Techniques**
CO1	Solve a set of algebraic equations representing steady state models formed in engineering problems
CO2	Fit smooth curves for the discrete data connected to each other or to use interpolation methods over these data tables
CO3	Predict the system dynamic behavior through solution of ODEs modeling the system
CO4	Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.
CO5	Demonstrate proficiency of using MATLAB, VB, ANSYS, EES etc.,
CO6	Solve a set of algebraic equations representing steady state models formed in engineering problems
Course Name:-	**Energy Conservation and Management**
CO1	Demonstrate energy management principles, identify need, organizing it. carry out energy auditing.
CO2	Conduct economic analysis of any industry or power plant, obtain conclusion and suggest it to industry.
CO3	Interpret financial appraisal methods, and thermodynamic analysis, and estimate financial budget of visited industry.
Course Name:-	**Design of Air-Conditioning Systems**
CO1	Demonstrate Air-conditioning processes and psychometric
CO2	Illustrate Ventilation, Necessity, Natural Ventilation, wind effect, Measurement of thermal comfort indices.
CO3	Formulate and solve problems of cooling, heating load calculations.
CO4	Design Air distribution, duct design for suitable problem.
CO5	Analyze Sound propagation, SPL, PWL, Sound Intensity, room acoustics and apply noise control techniques
	M.Tech Part-II Sem-I
Course Name:-	**Project Stage-I**
CO1	Identify problems and to plan methodologies to solve problems.
CO2	Carry out exhaustive literature review, study &evaluate collected literature critically and identify the gaps based on the review.
CO3	Select the specific problem for the study as a project
CO4	Demonstrate technical writing while preparing project report and present it to evaluation committeeto demonstrate presentation skills acquired.
	M.Tech Part-I Sem-I
	Design Engineering
Course Name:-	**Communication Skills**
CO1	Students will be able to understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communi
CO2	Students will be able to understand the power of Verbal and Non-verbal communication.
CO3	Students will be able to understand the research methods associated with the study of human communication, and apply at least one of those approaches to the analysis and evaluation of human communication
CO4	Students will be able to find, use, and evaluate primary academic writing associated with the communication discipline.
CO5	Students will be able to communicate effectively orally and in writing

Course Name:-	Analysis and Synthesis of Mechanisms
CO1	Study basic concepts of Analysis and synthesis of mechanisms
CO2	Understand curvature theory of mechanism.
CO3	Apply the graphical techniques commonly used in the kinematic synthesis ofplanar mechanismsto synthesize the real-world mechanisms.
CO4	Apply the analytical techniques commonly used in the kinematic synthesis of planar mechanismsto synthesize the real-world mechanisms.
CO5	Use coupler curves.
CO6	To learn the kinematic analysis of spatial mechanisms
Course Name:-	Experimental Stress Analysis
CO1	To identify the need of stress analysis, type of experimental methods for stress analysis.
CO2	To obtain the knowledge of basics of elasticity with concepts of stress, strain and displacement in 2D regime.
CO3	To describe the mechanical, optical, pneumatic and electrical strain gauges for strain measurement
CO4	To be familiar with electrical strain gauges with adhesives, mounting techniques, temperature compensation techniques and more emphasis on wheatstone's bridge network for strain analysis.
CO5	To understand nature of light and working principle of optical instruments such as plane and circular polariscope.
CO6	To understand effect of stressed model in plane and circular polariscope, properties of materials for 2-D Photoelasticity , introduction to moiré fringe technique and coating methods.
Course Name:-	Advanced Mechanical Vibration
CO1	Formulate equation of motion of multi-degree of freedom system and evaluate vibration parameters.
CO2	Understand vibration measuring equipment.
CO3	Use of modal analysis to evaluate vibration parameters.
CO4	Design and understand and of vibration control systems
CO5	Understand the phenomena of non-linear vibration.
CO6	Understand various aspect of machine condition monitoring.
Course Name:-	Machine Tool Design
CO1	Study kinematics of various machine tools.
CO2	Understand principles of various machine tool feed and speed drives.
CO3	Design power screws, slideways and machine tool spindle with bearings.
CO4	Apply modular design aesthetics and ergonomics for machine tool.
CO5	Design structure and other auxiliary mechanism of machine tool.
CO6	Study acceptance test of machine tools and methods of machine tool condition.
	M.Tech Part-II Sem-I
Course Name:-	Project Stage-I
CO1	Identify problems and to plan methodologies to solve problems.
CO2	Carry out exhaustive literature review, study &evaluate collected literature critically and identify the gaps based on the review.
CO3	Select the specific problem for the study as a project
CO4	Demonstrate technical writing while preparing project report and present it to evaluation committeeto demonstrate presentation skills acquired.
FIRST YEAR ENGINEERING (GROUP A)	
	F.Y. B Tech Part-I Sem-I
Course Name:-	Engineering Mathematics-I
CO1	Solve system of linear algebraic equations by using Matrix.
CO2	Find first and higher order partial derivatives of function.
CO3	Calculate expansion, Jacobian and maxima and minima of functions of two variables by using partial derivatives.
CO4	Draw the curve with justification.
CO5	Evaluate double and triple integral for area and volume.
Course Name:-	Engineering Physics
CO1	Define and explain basic laws, principles and ideas of physics related to engineering curriculum.
CO2	Understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, and Quantum mechanics.
CO3	Understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms the base of many modern devices and technologies.
Course Name:-	Engineering Graphics
CO1	Students will understand BIS conventions of drawing and geometrical constructions; also understand the concept of first angle & third angle method of projection.
CO2	The students will understand & draw projection of lines, planes & solids. Students will draw orthographic projection, sectional views and isometric projection of diff. engineering components.
CO3	Students will draw sections of solids of different surfaces.
CO4	Students will able to understand about the basic Industrial requirement of drawing.
Course Name:-	Communication Skills
CO1	Students understand the concept of communication and its process & identify the difference between verbal and non-verbal communication.
CO2	Students know the correct usage of English grammar & pronunciation of sounds with proper stress and intonation.
CO3	Students know LSRW skills and apply them to improve communication skills.
Course Name:-	Energy and Environment Engineering
CO1	To understand basic laws, principles and Environment aspect of conventional and non non-conventional sources. And understand advantages and disadvantages to protect the environment.
CO2	To acquire the knowledge of Methods and Techniques of energy conservation in ventilation, air conditioning, Pumps, fans, blowers, Light and Lightening techniques
CO3	To Understand Sources, effects, and control of Air Pollution, water Pollution, soil Pollution, Noise Pollution and Radioactive materials
Course Name:-	Basic Civil and Mechanical Engineering
CO1	Students are able to apply knowledge of Civil Engineer in its various branches according to building material properties.
CO2	Students are understand Principle of planning, building bye-laws and component of building.
CO3	Students are understand application of surveying in actual practice to prepare plan or map.

FIRST YEAR ENGINEERING (GROUP B)	
	F.Y. B Tech Part-I Sem-II
Course Name:-	**Engineering Mathematics-I**
CO1	Solve system of linear algebraic equations by using Matrix.
CO2	Find first and higher order partial derivatives of function.
CO3	Calculate expansion, Jacobian and maxima and minima of functions of two variables by using partial derivatives.
CO4	Draw the curve with justification.
CO5	Evaluate double and triple integral for area and volume.
Course Name:-	**Engineering Chemistry**
CO1	Define and explain basic laws, principles and ideas of physics related to engineering curriculum.
CO2	Understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, and Quantum mechanics.
CO3	Understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms the base of many modern devices and technologies.
Course Name:-	**Engineering Mechanics**
CO1	Students are able to apply knowledge of applied mechanics to solve various Engineering problems.
CO2	Students understand various force system and its effects on static and moving bodies.
CO3	Students understand concepts of equilibrium.
CO4	Students understand geometrical properties of plain laminae.
CO5	Students understand dynamics of rigid bodies.
Course Name:-	**Computer Programming in C**
CO1	Student should be aware of c programming environment.
CO2	To demonstrate the concept of problem solving skills.
CO3	Student should demonstrate, analyze and debug the c program.
CO4	Understand and analyze the c programs for various problem statements.
Course Name:-	**Basic Electrical and Electronics Engineering**
CO1	Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
CO2	Provide knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
CO3	Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as p-n junction diode, Zener diode. To apply the basics of diode to describe the working of rectifier circuitssuch as Full and half wave rectifiers.
CO4	Sketch and explain the basic block of communication system. List and explain the different number system. Solve examples on converting one form of number system to another form. State Boolean laws and theoremsand logic gates.

CO PART II

	Chemical Engineering
	S.Y. B Tech Part-II Sem-IV
Course Name:-	Numerical Methods in Chemical Engineering
CO1	Apply Numerical Methods in the field of Science and some fields of Engineering.
CO2	Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations
CO3	Familiar with programming with numerical packages like C.C++,Scilab and Matlab
Course Name:-	Chemical Engineering Thermodynamics -I
CO1	Apply the first and second laws of thermodynamics to chemical processes.
CO2	Compute the properties of ideal and real mixtures.
CO3	Analyze the behavior of flow and non-flow processes using mass and energy balances
CO4	Estimate heat and work requirements for industrial processes.
CO5	Determine the efficiency of processes involving heat into work, refrigeration and liquefaction
Course Name:-	Heat Transfer Operations
CO1	Perform heat flux calculations through constant and variable area elements and estimate heat transfer rate and optimum insulation thickness
CO2	Develop correlations using elementary dimensional analysis for heat transfer without phase change and with phase change
CO3	Comprehend the laws governing radiation mode and develop correlation for various systems.
CO4	Perform functional design of heat transfer equipment heat exchangers & evaporators.
Course Name:-	Basic Human Rights
CO1	Learn to respect others caste, religion, region and culture.
CO2	Be aware of their rights as Indian citizen.
CO3	Understand the importance of groups and communities in the society.
CO4	Realize the philosophical and cultural basis and historical perspectives of human rights.
CO5	Understand the history of human rights.
CO6	Make them aware of their responsibilities towards the nation.
Course Name:-	Strength of Material
CO1	Select material based on strength properties of materials.
CO2	To analyze and design thick cylinder, spheres and thin cylinders, spheres.
CO3	To design chemical engineering equipments and plants while including safety, environment.
CO4	To have knowledge of various engineering materials available in market.
Course Name:-	Mini Project -II
CO1	Understand, plan and execute a Mini Project with team.
CO2	Implement basic engineering knowledge.
CO3	Prepare a technical report based on the Mini project.
CO4	Deliver technical seminar based on the Mini Project work carried out.
T.E. Part-II Sem-VI	
Course Name:-	Industrial Economics, Management & Entrepreneurship
CO1	Understand basic models of the behavior of firms and industrial organization and how they can be applied to policy issues.
CO2	Manipulate these models and be able to solve analytically problems relating to industrial economics.
CO3	Apply the models to important policy areas while being aware of the limitations of the theory.
Course Name:-	Plant Utilities and Pollution Control
CO1	Know the utilities like water, air, refrigeration, insulation, refractories etc.
CO2	Know the various properties like ph, hardness of water and they can measure them in lab.
CO3	Develop technical knowledge and apply design skills related to utilities and pollution control in chemical industries
Course Name:-	Mass Transfer II
CO1	Conceptually describe the role of mass transfer in various unit operations including distillation, drying, humidification etc.
CO2	Use the McCabe-Thiele Method, Ponchon Savarit Method for solving distillation problems and analyze & design constant rate drying systems.
CO3	Develop and apply criteria for selecting among alternative separation technologies available.
CO4	Select appropriate economical processes in industries.
Course Name:-	Process Dynamics & Control
CO1	Model a physical process.
CO2	Gain the knowledge of various controller designs, and methods of controller tuning.
CO3	Understand various complex control schemes, characteristics and application of control valves.
CO4	Use enhanced feedback control with cascade, feed forward, and model-based structures
Course Name:-	Chemical Reaction Engineering-I
CO1	To analyze laboratory data for determining the order of reaction and reaction rate constant.
CO2	To relate rate of reaction with design equation for reactor sizing.
CO3	To make comparisons of ideal reactor types (batch, plug flow, mixed flow, etc.) and select the most suitable one.
CO4	To determine optimal ideal reactor design for multiple reactions for better yield or selectivity of desired product.
Course Name:-	Process Simulation Lab
CO1	Understand, plan and execute a chemical Processes
CO2	Implement basic engineering knowledge.
CO3	Prepare a computer based technical report.
B.E. Part-II Sem-VIII	
Course Name:-	Chemical Processes & Green Technology

CO1	Understand the detailed of chemical manufacturing process
CO2	Understand the role of chemicals for society
CO3	Understand flow sheeting of different process with unit operations and unit process involved.
CO4	Understand bio-fuel technology and importance of alternatives fuels for today's environment.
CO5	Application of knowledge for practical purposes
Course Name:-	**Transport Phenomena**
CO1	Understand, analyze and solve steady state problems, particularly in context of momentum, heat and mass transfer.
CO2	Analyze steady state shell momentum, energy and mass balance for laminar flow across various boundary conditions.
CO3	Apply equations of change in various co-ordinate systems and able to solve problems for cases that are well defined and also slightly defined.
CO4	Correlate the analogy between momentum, heat and mass transport.
Course Name:-	**Process Economics & Project Engineering**
CO1	Apply the chemical engineering knowledge to practical situations for the purpose of accomplishing something that will be economical and beneficial to the society
CO2	Understand and work problems that account for the time value of money, cash flows occurring at different times with different amounts, and equivalence at different interest rates.
CO3	Determine the breakeven for one or two alternatives and calculate the payback period.
CO4	Make computations for interest rates, rates of return and understand interest rate statements that include nominal and effective rates.
CO5	Utilize different annual worth techniques to evaluate and select alternatives.
Course Name:-	**Elective -II Distillation**
CO1	Perform vapor liquid equilibrium calculations for ideal and non ideal systems.
CO2	Perform mass and energy balance calculations
CO3	Determine number of stages required for separation
CO4	Solve distillation problems using Lewis and McCabe Thiele methods, solve multi-component distillation problems using shortcut methods
Course Name:-	**Elective-III: Energy Conservation and Recovery**
CO1	Impart knowledge in the domain of energy conservation and recovery
CO2	Bring out Energy Conservation Potential
CO3	Inculcate knowledge and skills about assessing the energy efficiency in industry
Course Name:-	**Advanced Separation Processes**
CO1	Understand fundamentals of separation processes.
CO2	Understand various techniques to select separation process.
CO3	Understand various parameters affect on separations.
CO4	Understand application of separation processes in various industries
	F.Y. M.Tech Sem-II
Course Name:-	**ADVANCED MASS TRANSFER**
CO1	Understand the concept of separation factor and separating agent.
CO2	Determine the degrees of freedom using phase rule and description rule.
CO3	Compare multi-stage operations.
CO4	Design binary distillation column using McCabe Thiele and Ponchon-Savaritmethods.
CO5	Design multi-component distillation columns using short cut and rigorous calculationmethods.
Course Name:-	**ADVANCED SEPARATION TECHNIQUES**
CO1	Classify the membranes.
CO2	Differentiate various membrane processes.
CO3	Understand the methods of membrane preparation.
CO4	Compare membrane process with other methods of separation.
CO5	Evaluate the flux of solvent and solute through membrane.
Course Name:-	**ELECTIVE - IIIRisk Analysis and Hazops**
CO1	Identify the type of risk involved in a chemical plant operation
CO2	Manage risk and prepare disaster management options
CO3	Understand safety, energy and environmental impact audit
CO4	Implement the procedure of root cause/fault tree analysis
CO5	Conduct HAZOP study for 'to be commissioned' chemical plants
Course Name:-	**ELECTIVE - IV Energy Management**
CO1	Implement energy audit for a chemical plant.
CO2	Suggest methods of conserving energy requirement.
CO3	Evaluate the suitability of renewable energy resources.
CO4	Analyze the energy utilization of a process equipment.
Course Name:-	**SEMINAR**
CO1	CO1: Communicate with group of people on different research topics
CO2	CO2: Prepare a seminar report that includes consolidated information on a research topic
Course Name:-	**COMPUTATIONAL LAB – II/ MINI PROJECT**
CO1	Carry out thermodynamic property estimations using property estimation and property analysis in Aspen
CO2	Simulate and design individual Mixer, splitter, heat exchangers, pumps, compressors, flash units, reactors, distillation columns, calculator block, duplicator, multipliermodels
CO3	Simulate processes involving multiple units and apply sensitivity, design specifications and case study tools in Aspen.
CO4	Simulate and optimize process flow sheets including streams containing solids using sequential modular approach as well as equation oriented approach.
CO5	Carry out dynamic simulation, pinch analysis and cost estimation.
CO6	Design heat exchanger using Exchanger design and rating and distillation column using RADFRAC models.

	S.Y. M.Tech Sem-IV	
Course Name:-	**PROJECT WORK - STAGE II**	
CO1	Implement the methods/techniques identified in dissertation part-A	
CO2	Analyze and interpret the results obtained	
CO3	Compare the results obtained with literature	
CO4	Demonstrate the original contribution to knowledge	
	CIVIL ENGINEERING	
	S.Y. B Tech Part-II Sem-IV	
Course Name:-	**STRUCTURAL MECHANICS**	
CO1	Student will able to know the effect of external action on elastic body.	
CO2	Student will able to know the different engineering properties of the materials.	
CO3	Student will able to analyze the stress, strain and deformation of elastic bodies under external action.	
CO4	Student will able to compute design forces.	
Course Name:-	**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.	
Course Name:-	**SURVEYING-II**	
CO1	Understand basics different types of curves on roads and their preliminary	
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	
Course Name:-	**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 geologist structures which have influece on the civil engineering structures.	
CO4	Understand how the various geological conditions affect the design parameters of structures.	
Course Name:-	**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	
Course Name:-	**SOFT SKILLS DEVELOPMENT**	
CO1	Learners will acquire interpersonal communication skills.	
CO2	Learners will develop the ability to work independently.	
CO3	Learners will develop the qualities like self-discipline, self-criticism and self-management.	
CO4	Learners will have the qualities of time management and discipline.	
CO5	Learners would be able to present themselves as an inspiration for others.	
T.E. Part-II Sem-VI		
Course Name:-	**THEORY OF STRUCTURES**	
CO1	Know the concept of determinacy and indeterminacy.	
CO2	Apply appropriate solution techniques to the problem.	
CO3	Analyze indeterminate structures by using different methods.	
CO4	Interpret the output of different methods	
CO5	Aware of the limitations of the methods of solution and their outcomes.	
Course Name:-	**GEOTECHNICAL ENGINEERING – II**	
CO1	Know different soil/ rock strata and use of this data for interpretation of bearing capacity.	
CO2	Understand the importance and basics of foundation engineering in the civil engineering project.	
CO3	Understand the classical theories of load bearing capacity and settlement of foundations.	
CO4	Understand the geological aspects of shallow and deep foundations.	
CO5	Understand the concept of the stability of slopes and study various methods of evaluating the stability of slopes.	
CO6	Understand the various concepts of modern foundation techniques.	
Course Name:-	**ENVIRONMENTAL ENGINEERING –II**	
CO1	Explain sources, characteristics, collection methods and effluent standards for wastewater disposal as per norms.	
CO2	Design the primary, secondary and low cost treatment processes for wastewater.	
CO3	Explain the necessity and importance of solid waste management.	
CO4	Describe air pollution, its effect and controlling techniques.	
CO5	Summarize different legal aspects related to environment protection for sustainable development.	
6	**ENGINEERING MANAGEMENT**	
CO1	Understand the importance of mgt. in construction	
CO2	Apply the qauntitative techniques in practice	
CO3	Understood and apply techniques of material mgt.	
CO4	Use the concept of engineering economy	
CO5	Understand the importance of legal aspects in construction	
CO6	Use the advance techniques used in mgt.	
Course Name:-	**ENGINEERING GEOLOGY**	

CO1	Identify and classify the different types of minerals and rocks with their civil Engineering significance.	
CO2	Interpret the different types of geological structures with emphasis on civil engineering aspects.	
CO3	Identify the phenomenon of earthquake and landslides along with their civil engineering mitigation.	
CO4	Acquire knowledge about groundwater and building stones.	
CO5	Investigate the suitability of site for construction of dams, reservoirs, bridges and tunnels etc.	
Course Name:-	STRUCTURAL DESIGN AND DRAWING I	
CO1	Analyze different types of loads acting on steel structures	
CO2	Design different members of roof truss and gantry girder	
CO3	Analyze and design components of steel structures like plate girder, foot bridge and building frame	
Course Name:-	SEMINAR	
CO1	Review the recent literature and select a relevant topic.	
CO2	Prepare the seminar report in best manner.	
CO3	Present the seminar work using advanced tools.	
B.E. Part-II Sem-VIII		
Course Name:-	DESIGN OF CONCRETE STRUCTURE II	
CO1	Find the meaning of design of concrete structures.	
CO2	Choose the suitable data (Basic Mechanics, Mathematics, and structural analysis) required for	
CO3	Design of Concrete structures.	
CO4	Analyze & Design of Reinforced concrete structure.	
CO5	Extend the concept of WSM, ULM to LSM for RCC Sections.	
CO6	Classify, analyze & design the prestressed concrete.	
CO7	To solve the practical problems by application of this course.	
Course Name:-	TOWN PLANNING AND TRANSPORTATION ENGINEERING	
CO1	Students should have gain knowledge of special RCC structures and should be able to design by using analytical method and software.	
Course Name:-	STRUCTURAL DESIGN OF FOUNDATION AND RETAINING STRUCTURES (ELECTIVE II)	
CO1	Design a combined and raft footing.	
CO2	Design a pile and pile cap.	
CO3	Analyze and design underwater construction.	
CO4	Know the types of retaining wall and its design.	
Course Name:-	ADVANCED CONSTRUCTION TECHNIQUES (ELECTIVE III)	
CO1	Understand the Advanced construction techniques	
CO2	Apply Advanced construction Techniques in Practice	
CO3	Approaches to enhance and introduce new trends in construction industry to face the construction problems	
CO4	Aware about importance of new construction techniques in Civil engineering.	
	F.Y. M.Tech Sem-II	
Course Name:-	THEORY OF PLATES & SHELLS	
CO1	Understand and derive governing differential equation for deflected shape of rectangular plates	
CO2	Solve governing differential equation of deflected shape of rectangular plate for various loading and support conditions.	
CO3	Understand and derive governing differential equation for deflected shape of circular plate	
CO4	Solve governing differential equation of deflected shape of circular plate for various loading and support conditions.	
CO5	Understand membrane theory for internal forces in different shells.	
CO6	Understand different theories of analysis of shells.	
Course Name:-	FINITE ELEMENT METHOD	
CO1	Understand the different energy methods in structural analysis and basic concepts of finite element method.	
CO2	Analyse 1-D problems related to structural analysis like Bars, Trusses, Beams and Frames using finite element approach.	
CO3	Find solution to problems using direct approach methods like Rayleigh – Ritz or Galerkin's Method.	
CO4	Solve 2-D problems using knowledge of theory of elasticity.	
CO5	Students will be able to implement the knowledge of numerical methods in FEM to find the solution to the various problems in statics and dynamic.	
CO6	Analyse 1D, 2D, and 3D structures using different software packages based on FEM.	
Course Name:-	DESIGN OF COLD FORMED STEEL STRUCTURES	
CO1	Understand the types of cross sections, mechanical and thermal properties and applications of cold formed steel structures.	
CO2	Understand the design criteria and strength of thin elements and analyse various cross section for strength in tension, compression, flexure	
CO3	Design the CFS flexural members.	
CO4	Design the CFS compression members.	
CO5	Design the CFS members subjected to axial load and bending.	
CO6	Study and design various types of connections in cold formed steel structures.	
Course Name:-	DESIGN OF TALL STRUCTURES	
CO1	Identify and calculate magnitude of various loads acting on tall buildings.	
CO2	Understand various forms of structures, moment and force resisting systems in a structure.	
CO3	Identify various factors causing movements /twists in the building and their analysis and design.	
CO4	Understand various types of chimneys, their components, Analyse and design of chimneys.	
CO5	Understand various types of Cooling Towers, their components & feasibility, analyse and design a Cooling Tower.	
CO6	Understand various types of transmission towers, their components and suitability, analyse and design a transmission tower.	
Course Name:-	RESEARCH METHODOLOGY	
CO1	Understand concept of research, its types, methods, detailed procedure to identify and solve a research problem.	
CO2	Understand various mathematical techniques useful in research work.	
CO3	Understand various sampling techniques useful in research work.	
CO4	Understand various techniques for correlating and predicting different parameters with each other based on data collected.	
CO5	Design the experiments for research work.	

CO6	Analyse and interpret the data, results and to conclude the final results.
	S.Y. M.Tech Sem-IV
Course Name:-	**Project Stage-II**
CO1	Solve identified technical problem using acquired knowledge and skill.
CO2	Use latest equipment, instruments, software tools, infrastructure and learning resources available to solve the identified project problem.Procure resources, if required.
CO3	Interpret theoretical/experimental findings using available tools
CO4	Compare the results obtained with results of similar studies
CO5	Draw conclusions based on the results.
	ELECTRICAL ENGINEERING
	S.Y. B Tech Part-II Sem-IV
Course Name:-	**ELECTRICAL MACHINES – I**
CO1	To study diff. types, construction and operating principle of diff. types of electrical machines
Course Name:-	**ELECTRICAL INSTALLATION AND ESTIMATION**
CO1	To prepare estimates and costing of electrical installations of power system, To understand procedures of contracting and purchase
Course Name:-	**NUMERICAL METHODS AND PROGRAMMING**
CO1	To study and understand MATLAB programming.
CO2	To review mathematical concepts
CO3	To develop computer program for linear and nonlinear equations.
Course Name:-	**SOLID STATE DEVICES**
CO1	To study construction and characteristics of solid state devices.
CO2	To apply operational amplifier models in circuits employing negative feedback.
CO3	To design electronics circuit using Timer IC and voltage regulators.
CO4	To perform analysis of amplifiers using small signal models for the circuit elements.
CO5	To calculate the frequency response of circuits containing BJT, Op-Amp etc
Course Name:-	**ANALOG AND DIGITAL ELECTRONICS**
CO1	To review basic number system
CO2	To understand deign and characteristics of digital logic gates.
CO3	To study different techniques in use of digital circuits.
CO4	To design digital systems
Course Name:-	**ELECTRO MAGNETIC THEORY**
CO1	To understand vector relations in diff. forms
CO2	To analyze diff. laws and their solution
CO3	To study about magneto static
CO4	To understand time varying field and effect of magnetism in transmission line
Course Name:-	**INDUSTRIAL SAFETY**
CO1	To understand importance of safety in industrial environment
CO2	To understand different safety procedures in an industrial environment
Course Name:-	**INTRODUCTION TO NON-CONVENTIONAL ENERGY SOURCES**
CO1	To review energy scenario.
CO2	To understand basic concepts, construction and operational features of different non-conventional sources.
Course Name:-	**SOFTWARE TECHNIQUES**
CO1	To understand different techniques of software models
CO2	To understand verification and validation of software.
CO3	To analyze software project management
	T.E. Part-II Sem-VI
Course Name:-	**Advanced Electrical Measurements**
CO1	Demonstrate different types of meters
CO2	Analyze passive transducers
CO3	Evaluate active transducers
CO4	Discriminate electromechanical transducers
CO5	Criticize digital transducers
CO6	Distinguish virtual instrumentation
Course Name:-	**Communication Engineering.**
CO1	Explain the electrical communication and classification of signals. Analyze the signal transmission using Fourier transform
CO2	Understand the need of modulation, Demodulation process and applications of communications systems. Design the super heterodyne AM receiver,
CO3	Describe the concepts of instantaneous frequency, band-width of angle modulated waves compare with AM system
CO4	Distinguish the concept of sampling with different modulation techniques
CO5	Study of Digital Data Transmission, Digital communication system, Cellular telephony, Information theory and coding.
CO6	To understand working of PSTN ,Block codes
Course Name:-	**Electrical Machine Design**
CO1	Understand design concepts of Electrical Machines.
CO2	Apply basics of Electrical materials required for machine design.
CO3	Explain three phase Transformer.
CO4	Analyze design of DC Machines.
CO5	Explain three phase Induction motor.
CO6	Discuss design of three phase Synchronous machines.
CO7	Discuss design of starters & regulators.

Course Name:-	Power System-III
CO1	Recall Power System Stability & Control
CO2	Explain Different Types Power System Stability
CO3	Summarize the Methods Of Improving Stability
CO4	Compare Different Methods Of Power System Control With Steady State Analysis And Dynamic Response Of An Isolated Power System
CO5	Detect Optimal Power System Operation
CO6	Demonstrate Power System Security
Course Name:-	Electrical Drives
CO1	Describe the construction/working principle of different types of drives and types of loads and their characteristics.
CO2	Understand control of dc motor by Single & Three phase Converter.
CO3	Understand the control of dc motor by Chopper
CO4	Explain Induction Motor Drives by Stator Side Control & Stator Frequency Control Methods.
CO5	Summaries the various types of induction motor drives Rotor side control
CO6	Classify the Synchronous Motor Drives and Control Mechanisms.
	B.E. Sem-VIII
Course Name:-	Law for Engineers
CO1	To appreciate the basic principle HVDC system and overall HVDC system.
CO2	To be acquainted with the basic concepts grid control and characteristics.
CO3	To learn the different methods for protection of HVDC system.
CO4	To recognize the harmonics in HVDC system and use of different filters in HVDC system.
CO5	To comprehend the basic concepts for reactive power compensation in HVDC system.
CO6	To realize the different types of multi-terminal DC Systems.
Course Name:-	EHVAC
CO1	Describe the Engineering aspect and growth of EHVAC Transmission line and explain various power system characteristics.
CO2	Calculations of line and ground power system parameters and their properties.
CO3	Discriminate voltage gradients of conductor for EHVAC.
CO4	Estimate theory of the traveling waves and standing wave.
CO5	Distinguish lighting and lighting protection.
CO6	Identify over voltage in EHVAC system.
CO7	Describe power frequency voltage control and over voltage.
CO8	Define the Insulation Co-ordinations.
Course Name:-	Electrical Generation and Utilization
CO1	To empathize the Conventional Energy Sources:
CO2	Basic Concepts of Solar Energy Technology
CO3	Basic Concepts of Wind Energy Technology
CO4	Application of Electrical Energy ((Electric Heating and Welding)
CO5	Application of Electrical Energy(Transportation Ex: Traction
CO6	Energy Consumption analysis & Control Technique in DC Motors
Course Name:-	Electrical maintenance and electrical energy audit
CO1	Understand procedure for electrical maintance
CO2	Understand Maintenance of Distribution Transformers
CO3	Classify energy intensive systems.
CO4	Decide the energy conservation and energy efficiency opportunities in the systems.
CO5	Prepare action plan to monitor energy consumption pattern of systems and processes.
CO6	Compute the energy saving potential in electrical and thermal utilities.
CO7	Prepare detailed energy audit report of system or processes.
Course Name:-	Law for engineers
CO1	To understand Fundamental Rights, Judicial Structure
CO2	To understand Human Rights in Indian tradition and specialized agencies
CO3	To understand Intellectual property rights and Concept, historical perspective of patents law in India
CO4	To understand Right to Information Act, 2005 covering, Evolution and concept; Practice and procedures
CO5	To understand Corporate Law, Meaning of corporation; international norms for control, FEMA 1999,
	M.TECH. I,SEM II
Course Name:-	AC/ DC DRIVES
CO1	Explain the basics of Electrical Drives.
CO2	Develop the closed loop controlled DC drives.
CO3	Describe the modern trends of DC Dives.
CO4	Explain the basics methods of speed control of Induction motor.
CO5	Apply the various speed control methods for controlling the speed of Induction motor
CO6	Apply the various speed control methods for controlling the speed of synchronous motor
CO7	Use vector control method for controlling the Induction motor drive
Course Name:-	ADVANCED POWER SYSTEM PROTECTION
CO1	Understand philosophy of various relays used in power system protection.
CO2	Understand basic principle of digital relaying
Course Name:-	DISTRIBUTED GENERATION AND MICROGRID
CO1	Understand exploration of renewable energy sources
CO2	Understand philosophy of distributed generation
CO3	Understand various issues of DG with grid integration
CO4	Understand the concept of micro grid and various power quality issues.
Course Name:-	ENERGY MANAGEMENT AND AUDITING
CO1	Identify and describe present state of energy security and its importance.

CO2	Identify and describe the basic principles and methodologies adopted in energy audit of utility
CO3	Describe the energy performance evaluation of some common electrical and thermal installations and identify the energy saving opportunities.
CO4	Analyze the data collected during performance evaluation and recommend energy saving measures
	M.Tech. II (Electrical Engg.) SEM IV
Course Name:-	**PROJECT PHASE-II**
CO1	Impliment software and / or hardware model of proposed work
CO2	Perform analysis in detail of the proposed work
CO3	Validate results obtained of proposed work
CO4	Demonstrate of proposed work and write dissertion report
	ELECTRONICS ENGINEERING
	S.Y. B Tech Part-II Sem-IV
Course Name:-	**Electrical Machines and Instruments**
CO1	The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.
CO2	The skill to analyze the response of any electrical machine.
CO3	The ability to troubleshoot the operation of an electrical machine.
CO4	The ability to select a suitable measuring instrument for a given application.
CO5	The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.
Course Name:-	**Analog Communication Engineering**
CO1	Understand and identify the fundamental concepts and various components of analog communication systems.
CO2	Understand the concepts of modulation and demodulation techniques.
CO3	Design circuits to generate modulated and demodulated wave.
CO4	Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).
CO6	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
CO7	Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
Course Name:-	**Microprocessor**
CO1	Learner gains ability to apply knowledge of engineering in designing different case studies.
CO2	Students get ability to conduct experiments based on interfacing of devices to or interfacing to real world applications.
CO3	Students get ability to interface mechanical system to function in multidisciplinary system like in robotics, Automobiles.
CO4	Students can identify and formulate control and monitoring systems using microprocessors.
CO5	Students will design cost effective real time system to serve engineering solution for Global, social and economic context.
Course Name:-	**Signals and Systems**
CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.
CO2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
CO3	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.
CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.
CO5	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.
Course Name:-	**Numerical Methods and Computer Programming**
CO1	Use different computational techniques, do the analysis of problems as well as know the types and sources of error which will help them for solving complex engineering problems.
CO2	Solve transcendental and linear equations, compare different numerical techniques as well as choose a proper one as per the requirement of the problem for investigation of complex problems
CO3	Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values
CO4	Calculate the numerical integration based on interpolation & differentiation to do the stability analysis of above techniques
CO5	Understand the concept of POP & OOP as well as Write and demonstrate computer programs individually in C and C++.
CO6	Understand the operator overloading and type conversion in OOP using engineering Tool
Course Name:-	**Product Design Engineering**
CO1	Describe an engineering design and development process
CO2	Create simple products and create Documentation.
CO3	Work collaboratively on a team to successfully complete a design project.
CO4	Effectively communicate the results of final product in written and oral format.
Course Name:-	**Soft skill development**
CO1	Understand their strengths and weaknesses, type of personality, work preferences, style of communications.
CO2	Apply the principles of effective communications in learning/working situations.
CO3	Apply the principles and knowledge of effective time-, conflict management inlearning/working situations.
CO4	Develop or improve skills for working effectively in a team.
T.E. Part-II Sem-VI	
Course Name:-	**DIGITAL SIGNAL PROCESSING**
CO1	Perform analysis of signals by using DFT and wavelet transforms.
CO2	Design an IIR and FIR filters to solve engineering problems.
CO3	Realize the filters using different structures & use DSP Processor
CO4	Design multirate signal processing system
Course Name:-	**VIDEO ENGINEERING**
CO1	Solve the problems on video bandwidth, interlaced scanning, resolution and satellite TV
CO2	Demonstrate CCIR-B standards, camera tubes and picture tubes of monochrome and colour TV
CO3	Compare transmission and reception techniques, modulation and demodulatio techniques used in different international TV systems
CO4	Explain Digital TV, HD TV and Advance TV system.
Course Name:-	**Power Electronics**

CO1	Apply knowledge of power electronics to the analysis and design of power electronic circuit
CO2	Identify, formulate and solve engineering problems in the area of power electronics
CO3	Function on multidisciplinary teams through experiments and projects
CO4	Design and implementation ac-dc, dc-dc converter topologies
6	COMPUTER ARCHITECTURE AND OPERATING SYSTEM
CO1	Design and implement various blocks of Arithmetic Logic Unit
CO2	Design and implement control unit & processor and its analysis
CO3	Know the fundamentals of operating system and its components
CO4	Explain the process management and issues
CO5	Demonstrate classical IPC problems as well as various memory management schemes
Course Name:-	Electronic System design
CO1	Apply knowledge of signal conditioning for different sensor to design process controller
CO2	Identify, formulate and solve engineering problems in the area of biomedical system and digital hardware design
CO3	Function in multidisciplinary teams through industrial application experiments and projects
CO4	Design a electronic system, component to meet desired needs within realistic constraints
CO5	Use the EMI EMC legislation and standard necessary for electronics engineering practice
Course Name:-	Mini Project
CO1	Use fundamental knowledge to Design of basic electronic circuits
CO2	Perform the analysis of electronic circuits
CO3	Simulate the electronic circuits by using simulation software
CO4	Function on multidisciplinary teams using hardware implementation and testing of electronic circuits
B.E. Part-II Sem-VIII	
Course Name:-	MICROWAVE ENGINEERING
CO1	Analyze the microwave waveguides and passive circuit components.
CO2	Identify and differentiate the state of art in microwave tubes and their uses in real life
CO3	Indentify materials used in MMIC and microwave hazards
CO4	Differentiate solid state devices used in microwave based on their characteristics and operations
CO5	To understand various microwave measurement techniques
CO6	Expose students to different microwave antennas
Course Name:-	WIRELESS COMMUNICATION NETWORK
CO1	Explain wireless networking protocols (Bluetooth, Security etc.), architectures, and standards used for wireless communication systems.
CO2	Apply communication engineering concepts in preparing a link budget and design of cell geometry.
CO3	Discuss call establishment procedure.
CO4	Explain the importance of Multiple Access techniques, voice coding techniques and mobility management in GSM network
Course Name:-	Power Electronics and Drives
CO1	Ability to analyze and evaluate the three phase controlled converter.
CO2	Ability to build power electronic circuits using matlab tools.
CO3	Understand the fundamental principles and applications ac drives & dc drives.
CO4	Ability to design, analyze and understand the operation of inverter & Cycloconverter
Course Name:-	System on Chip
CO1	Demonstrate the components of system architectures, interconnection schemes and their performance issues.
CO2	Calculate & demonstrate different factors affecting the chip designing.
CO3	Specify the processors and interconnects required for particular application
CO4	Know the peripheral components of system and the tools used for implementing the system.
CO5	Develop & Analyze the applications like AES algorithm and Image Compression
	F.Y. M.Tech Sem-II
Course Name:-	Advanced DSP
CO1	Learner will be able to design adaptive filters for a given application
CO2	Learner will be able to design multirate DSP systems
CO3	Learner will be able to understand different models for spectrum estimation
CO4	Learner will be able to understand different methods for Random signal processing
CO5	Learner will be able to perform linear estimation and prediction of random signal
CO6	Learner will be able to perform various operations on given signal
Course Name:-	Nano Electronics
CO1	Learner will be able to acquire basics knowledge of engineering in the field Nano electronics
CO2	Learner will be able to acquire ,basic knowledge of MOSFET, FINFET, SOI-MOSFET which are new generation transistor technology
CO3	Learner will get ability to research and development in field of Nano electronics Devices and Materials which is recent trends in technology
CO4	Learner will be the part of emerging trends of Nano electronics devices
CO5	Learner will be able to understand all the recent applications, Engineering Tools and research views to the students
CO6	Learner will be able to understand data transmission, interfaces and displays design
Course Name:-	Radar Signal Processing: Elective- IV
CO1	Learner will be able to understand the history and application of radar system
CO2	Learner will be able to understand the signal models of radar system
CO3	Learner will be able to sample and quantize the signals in radar system
CO4	Learner will be able to analyze the different waveforms and match filters in radar system
CO5	Learner will be able to modify the radar system models by analyzing the Doppler frequency
Course Name:-	Internet of things: Elective-V
CO1	Learner will be able to understand the meaning of internet in general and IOT in terms of layers, protocols, packets peer to peer communication

CO2	Learner will be able to interpret IOT working at transport layer with the help of various protocols	
CO3	Learner will be able to understand IOT concept at data link layer	
CO4	Learner will be able to apply the concept of mobile networking to the internet connected devices	
CO5	Learner will be able to measure and schedule the performance of networked devices in IOT	
CO6	Learner will be able to analyze the challenges involve in developing IOT architecture	
	S.Y. M.Tech Sem-IV	
Course Name:-	**Project Stage-II**	
CO1	To make student aware of recent trends in Electronics and Telecommunication	
CO2	Student understand and Exhibits different phases of project Development.	
CO3	Implement software and / or hardware model of proposed work	
CO4	Perform analysis in detail of the proposed work	
CO5	Student will be able to demonstrate soft skill like working in team, documentation and presentation.	
	ELECTRONICS & TELECOMMUNICATION ENGINEERING	
	S.Y. B Tech Part-II Sem-IV	
Course Name:-	**Electrical Machines and Instruments**	
CO1	The ability to formulate and then analyze the working of any electrical machine using mathematical model under loaded and unloaded conditions.	
CO2	The skill to analyze the response of any electrical machine.	
CO3	The ability to troubleshoot the operation of an electrical machine.	
CO4	The ability to select a suitable measuring instrument for a given application.	
CO5	The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument.	
Course Name:-	**Analog Communication Engineering**	
CO1	Understand and identify the fundamental concepts and various components of analog communication systems.	
CO2	Understand the concepts of modulation and demodulation techniques.	
CO3	Design circuits to generate modulated and demodulated wave.	
CO4	Equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.	
CO5	Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).	
CO6	Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.	
CO7	Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.	
Course Name:-	**Microprocessor**	
CO1	Learner gains ability to apply knowledge of engineering in designing different case studies.	
CO2	Students get ability to conduct experiments based on interfacing of devices to or interfacing to real world applications	
CO3	Students get ability to interface mechanical system to function in multidisciplinary system like in robotics, Automobiles.	
CO4	Students can identify and formulate control and monitoring systems using microprocessors.	
CO5	Students will design cost effective real time system to serve engineering solution for Global, social and economic context.	
CO6	This course understanding will enforce students to acquire knowledge of recent trends like superscalar and pipelining and thus finds recognition of continuous updating.	
CO7	Learn use of hardware and software tools.	
CO8	Develop interfacing to real world devices.	
Course Name:-	**Signals and Systems**	
CO1	Understand mathematical description and representation of continuous and discrete time signals and systems.	
CO2	Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.	
CO3	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.	
CO4	Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.	
CO5	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.	
Course Name:-	**Numerical Methods and Computer Programming**	
CO1	Able to solve algebraic and transcendental equations by using numerical techniques and will be able to compare different numerical techniques used for this purpose and also will be able to choose a proper one as per the requirement of the problem.	
CO2	Able to solve a system of linear equations with any number of variables using different direct and iterative numerical techniques.	
CO3	Understand the concept of interpolation, finite difference operators and their relations, and can apply different interpolation techniques on equi-spaced or non equi-spaced data values.	
CO4	Prepare them to write computer programs for the numerical computational techniques.	
CO5	Understand application of the NMCP course in many engineering core subjects like signal processing, digital communication, numerical techniques in electromagnetics etc.	
CO6	Understand procedure-oriented and object oriented programming concepts.	
CO7	Capable of writing C and C++ programs efficiently.	
Course Name:-	**Soft-Skill Development**	
CO1	Able to set short and long term goals	
CO2	Work in team with conflict management and interpersonal relations	
CO3	Development of leadership qualities	
CO4	To do time management	
	Understand Corporate Etiquette,Ethics, Values and Laws	
T.E. Part-II Sem-VI		
Course Name:-	**Digital Signal Processing**	
CO1	Apply DFT as an analytical tool.	
CO2	Analyze LTI Systems using FFT algorithms.	
CO3	Design & Implement FIR and IIR systems.	
CO4	Implement various DSP Systems on DSP Processor.	
Course Name:-	**VLSI Design**	
CO1	Implement & Demonstrate HDL codes of digital designs using FPGA/ CPLD based technology.	
CO2	Explain the difference between VHDL and Verilog HDL.	
CO3	Model combinational circuits like adder, subtractor, decoder, encoder, multiplexer, parity generator, Parity checker, comparator using different styles of modeling in VHDL&/or Verilog and implement in FPGA/ CPLD using suitable EDA tool.	
CO4	Construct FSM, Model sequential logic circuits like counter & sequence detector and simulate it for functional verification.	

CO5	Describe the features & internal architectures of CPLD (XC 9572) & Spartan IIIE FPGA (XC3S500E).
CO6	Demonstrate practical skills in simulating & testing digital modules.
Course Name:-	**Microprocessors and Microcontrollers**
CO1	Know the architecture of 8085, 8051 and PIC microcontrollers.
CO2	Write programs over simulator & 8085 microprocessors.
CO3	Use the knowledge of instruction set to perform practical over 8051 and PIC microcontrollers.
CO4	Interface 8255, 8279, 8155, DAC & other devices to microprocessor & microcontroller
Course Name:-	**Optical Communication & Network**
CO1	Elaborate the basic optical communication along with the simulation and modeling tools.
CO2	Differentiate the different types of optical fiber structures and light propagating mechanisms.
CO3	Acquire knowledge of signal degradation mechanism in optical fiber.
CO4	Understand the construction and working optical sources and detectors.
CO5	Describe the optical receiver operation, WDM and optical network in detail.
Course Name:-	**Industrial Management**
CO1	Demonstrate that how a person is getting selected in a company, how the performance of employee is evaluated.
CO2	Analyze the methods of performance appraisal and find the best out of them.
CO3	Define both marketing and selling concept.
CO4	Understand the techniques used for selling the product.
CO5	Explain about Entrepreneurship.
CO6	Solve assignment, transportation problems using different Operations Research methods & solve project management problems using CPM & PERT.
Course Name:-	**Electronic System Design**
CO1	Understand and design simple electronics systems.
CO2	Apply the knowledge of sensors in designing different electronics systems.
CO3	Design & perform electronics systems based on microcontrollers.
CO4	Use these skills to implement mini projects based on electronics systems.
B.E. Part-II Sem-VIII	
Course Name:-	**Wireless Communication**
CO1	Students will be able to Distinguish the major cellular communication standards (1G/2G/3G systems)
CO2	Students will be able to characterize the tradeoffs among frequency reuse, signal-to-interference ratio, capacity, and spectral efficiency.
CO3	Students will be able to characterize large-scale, small-scale propagation models and their corresponding path losses.
CO4	Students will be able to Characterize TDMA, FDMA and CDMA.
CO5	Students will be able to Install and maintain wireless communication equipment and wireless networks and study, analyze, and critically evaluate the major product offerings of current vendors, their costs, and application
Course Name:-	**Image Processing**
CO1	Students will be able to understand digital image fundamentals.
CO2	Students will be able to understand and apply image enhancement techniques.
CO3	Students will be able to understand and apply morphological image processing.
CO4	Students will be able to understand and apply image segmentation approaches.
CO5	Students will be able to understand and use different image processing applications.
Course Name:-	**Seminar And Project**
CO1	Students will be able to explain the recent trends in electronics & telecommunication
CO2	Students will be able to improve communication skills
CO3	Students will be able to apply different phases of project development.
CO4	Students will be able to demonstrate soft skills like working in team, documentation and presentation.
Course Name:-	**Mobilecommunication(Elective II)**
CO1	Students will be able to explain basics of Mobile communication.
CO2	Students will be able to explain Wireless LAN.
CO3	Students will be able to describe Mobile Transport & Network layers
CO4	Students will be able to explain.
CO5	Security issues in Wireless Systems
Course Name:-	**Broadband Communication**
CO1	Students would be able to demonstrate the working or telephone exchange.
CO2	Students would be able to predict the standard utilization of ISDN along with its types of channels, services, medium etc.
CO3	Using the standards used for up gradation in the performance of the exchanges.
CO4	Students would be able to demonstrate the working of Broadband Integrated Services Digital Networks (B-ISDN)
CO5	Students would be able to present the operation of ATM switches; overall network along with the advanced standards utilized the network
Course Name:-	**Audio-Video Engineering**
CO1	Students will able to analyze nature of different Audio and Video signals.
CO2	Students will able to rectify fault detection in TV- set and CD player.
CO3	Students will able to detect faults in TV- set using Pattern Generator.
Course Name:-	**Digital Image Processing**
CO1	List fundamental steps involved in Digital Image Processing.
CO2	Apply different image transforms and filtering techniques on an image.
CO3	Apply and analyze image enhancement techniques.
CO4	Demonstrate an application based on image processing.
CO5	Perform operations on color image processing.
Course Name:-	**Mechatronics (Elective II)**
CO1	Student can learn Basic mechanical operations & Processes
CO2	Students can understand & implement actuators according to need
CO3	Student can learn understand PLC , its requirements & development of PLC software

CO4	Students can Design & Develop Electro-mechanical System
Course Name:-	**Artificial Neural Networks (Elective-II)**
CO1	Use analogy of human neural network for understanding of artificial learning algorithms
CO2	The student will show skills for using back propagation algorithm.
CO3	The student will exhibit the knowledge of radial basis function network
CO4	The student will show understanding of self organizing maps.
Course Name:-	**Remote Sensing & GPS (Elective-II)**
CO1	Fully equipped with concepts, methodologies and applications of Remote Sensing Technology.
CO2	Prepare the candidates for National and Global Employability
CO3	Acquire skills in handling instruments, tools, techniques and modeling while using Remote Sensing Technology
CO4	It empowers the candidate with confidence and leadership qualities.
Course Name:-	**Operating System (Elective-II)**
CO1	Know the architecture of operating system
CO2	Understand Processes & Threading environment in operating systems
CO3	Know the memory & I/O issues in OS
CO4	Compare different operating systems
	F.Y. M.Tech Sem-II
Course Name:-	**ESTIMATION AND DETECTION THEORY**
CO1	1.Learner will have basic knowledge of linear algebra.
CO2	2.Acquire basics of statistical decision theory used for signal detection and estimation.
CO3	3.Examine the detection of deterministic and random signals using statistical models.
CO4	4.Examine the performance of signal parameters using optimal estimators.
CO5	5.Study different estimation schemes such as ML and MMSE estimators
Course Name:-	**INFORMATION THEORY AND CODING**
CO1	1.Learner will be able to formulate equations for entropy mutual information andchannel capacity for all types of channels.
CO2	2.Learner will be able to distinguish between different types error correcting codesbased on probability of error
CO3	3.Learner will be able to design a digital communication system by selecting an appropriate error correcting codes for a particular application.
CO4	4.Learner will be able to explain various methods of generating and detecting differenttypes of error correcting codes
CO5	5.Learner will be able to formulate the basic equations of linear block codes.
CO6	6.Learner will be able to compare the performance of digital communication system byevaluating the probability of error for different error correcting codes
Course Name:-	**Wireless Sensor Network Design**
CO1	1.Student will understand the need of WSN and also will analyze the challenges in creating WSN
CO2	2.Student will be able to design the architecture of WSN
CO3	3.Student will be able analyze the power and security constraints in WSN
CO4	4.Student will study different operating system to operate WSN
CO5	5.Student will be able to understand the basic functioning of WSN at physical layer
CO6	6.Student will understand different protocols at network layer to for multiple channel accessing
Course Name:-	**Digital VLSI Design**
CO1	1.Learner will be able to understand MOSFET device structures their physicaloperations, Current voltage characteristics.Fabrication process of MOS device,Making circuit with MOS devices their design equation. designing layout of such circuits, studying pass transistors
CO2	2.Learner will be able to understand VHDL language for synthesizing Digital Circuits. Digital circuits include asynchronous and synchronous design issues and statemachine synthesizing this circuits. Building state machines with Moore and mealymachines. Understanding how to write package,sub program and test benches.
CO3	3.Learner will be able to understand Programming Technologies, Programmable LogicBlock Architectures, Programmable Interconnects, Programmable I/O blocks inFPGAs, Dedicated Specialized Components of FPGAs, and Applications of FPGAs.
CO4	4.Learner will be able to understand designing of SRAM and DRAM.
CO5	5.Learner will be able to implement Floor planning concepts, shape functions and floor plan sizing, understanding types of local routing problems Area routing, channelrouting, global routing, algorithms for global routing.
CO6	6.Learner will be able to analyze Need of Design for Testability (DFT), Controllability, predictability, testability, built in Self Test (BIST), Partial and full scan check.Understanding the boundary scancheck, JTAG, Test Access Port (TAP) controller.
Course Name:-	**Research Methodology**
CO1	1.Learner will learn the meaning, objective , motivation and type of research
CO2	2.Learner will be able to formulate their research work with the help of literature review
CO3	3.Learner will be able to develop an understanding of various research design and techniques
CO4	4.Learner will have an overview knowledge of modeling and simulation of research work
CO5	5.Learner will be able to collect the statistical data with different methods related to research work
CO6	6.Learner will be able to write their own research work with ethics and non-plagiarized way
	S.Y. M.Tech Sem-IV
Course Name:-	**PROJECT WORK - STAGE II**
CO1	To make student aware of recent trends in Electronics and Telecommunication
CO2	Student understand and Exhibits different phases of project Development.
CO3	Implement software and / or hardware model of proposed work
CO4	Perform analysis in detail of the proposed work
CO5	Student will be able to demonstrate soft skill like working in team, documentation and presentation.
	INFORMATION TECHNOLOGY ENGINEERING
	S.Y. B Tech Part-II Sem-IV
Course Name:-	**Microprocessors and Microcontrollers**

CO1	To design and implement programs on 8086 microprocessor.
CO2	To design I/O circuits and Memory Interfacing circuits.
CO3	To exhibit knowhow on micro-controller interfaces & programming.
CO4	To experiment with MCS51 and PIC18 micro-controller.
Course Name:-	**Data Structures and Applications**
CO1	To write neat code by selecting appropriate data structure and demonstrate a working solution for a given problem.
CO2	To think of all possible inputs to an application and handle all possible errors properly.
CO3	To analyze clearly different possible solutions to a program and select the most efficient one.
CO4	To demonstrate the ability to write reusable code and abstract data types in C, using object-based way of thinking
Course Name:-	**Discrete Structures and Application**
CO1	To perform operations on various discrete structures such as sets functions, relations, and sequences
CO2	To solve problems using counting techniques, permutation and combination, recursion and generating functions
CO3	To construct and verify correctness of a Boolean expression using K-Maps and truth tables
CO4	To use graphs as tools to visualize and simplify Problems
CO5	To solve problems using algebraic structures (Rings, Monoids and Groups).
Course Name:-	**Internetworking Protocols**
CO1	To compare and contrast TCP and UDP in terms of the application that uses them.
CO2	To design network-based applications using the socket mechanism
CO3	To work with IPv4 addresses in terms of subnetting and supernetting.
CO4	To setup a host and network in terms of IP addressing
Course Name:-	**Product Design Engineering**
CO1	Create simple mechanical designs.
CO2	Create documents for knowledge sharing.
CO3	Manage own work to meet requirements.
CO4	Work effectively with colleagues.
CO5	Maintain a healthy, safe and secure working environment.
CO6	Provide data/information in standard formats.
CO7	Develop their knowledge, skills and competence.
Course Name:-	**Organizational Behavior**
CO1	Students will become more self aware and will have identified areas of development for long term effectiveness.
CO2	Students will understand the role that individuals play collectively to perform in organizations.

T.E. Part-II Sem-VI

Course Name:-	**COMPUTER GRAPHICS**
CO1	Understand basics of computer graphics & graphics devices.
CO2	Understand and implement different aspect of Geometric Transformations and
CO3	Computer Graphics Algorithm
Course Name:-	**INFORMATION SECURITY**
CO1	To be familiar with network security designs using available secure solutions
CO2	To master information security governance, and related legal and regulatory issues
CO3	To be familiar with how threats to an organization are discovered, analyzed, and dealt with
CO4	To be familiar with network security threats and countermeasures
CO5	To be familiar with advanced security issues and technologies
Course Name:-	**Internet Technology**
CO1	**Write** a code using Java Socket programmingby defining client-server model.
CO2	**Analyze** various Protocols using Protocol Analyzing Tools like wireshark and tcpdump.
CO3	**Explain**protocols in Network Layer (IPv6 and ICMPv6) by sketching its packet formats
CO4	**Explain** working of various Transport Layer and Application Layer Protocols (FTP, TFTP, HTTP, SMTP, SNMP, RTP, RTCP, VoIP) .
Course Name:-	**OPERATING SYSTEM-II**
CO1	understand fundamental concepts of Unix.
CO2	study Buffer cache
CO3	study File system in Unix & system calls
CO4	study structure of process
CO5	study Process control and scheduling
CO6	study Memory management and I/O subsystem.
Course Name:-	**Software Testing & Quality Assurance**
CO1	1) After undergoing this course the students will have the Basic knowledge regarding Software Testing and concepts used in IT industry.
CO2	2) Also students will be able to get the knowledge regarding the different Metrics used for developing the software project.
CO3	3) Students will able to learn about techniques used while developing and testing the software products.
Course Name:-	**APPLICATION DEVELOPMENT TOOL – II**
CO1	1. To understand fundamentals of .NET framework
CO2	2. To understand fundamental concepts like objects, classes, interfaces, polymorphism,delegates and events and its implementation in C#
CO3	3. to understand robust GUI applications using event handling and Windows form controlswith proper exception handling.
CO4	1. To understand I/O concepts, database connectivity using ADO.NET and collections andgenerics in C#

B.E. Part-II Sem-VIII

Course Name:-	**Storage Networks**
CO1	1. Define Storage Networks, study its applications.

CO2	2. Identify Key challenges in storage networks.
CO3	3. Be aware of significance of Data protection.
CO4	4. Understand importance of backup and replication
CO5	5. Know business needs of storage management.

Course Name:-	Cloud Computing
CO1	1. Use Cloud Platforms in Industry.
CO2	2. Understand Cloud Security and Virtualization.
CO3	3. Use Cloud Computing Applications.

Course Name:-	Information Technologyand Business Methodology
CO1	1. Identify the organizational structure of enterprise resource planning.
CO2	2. Describe skills needed by managers.
CO3	3. Explain various applications in SAP R/3.
CO4	4. Explain CRM technology by differentiating CRM and eCRM.
CO5	5. Interpret Concepts of Sales Force Automation(SFA) and Enterprise Marketing Automation(EMA).
CO6	6. Explain call centers mean customer interaction & Application Service Provider(ASP).

Course Name:-	Business Intelligent System
CO1	1. To introduce the students limitations of transaction processing systems and benefits of Analytical processing systems
CO2	2. Business Intelligence systems, its architecture and to use it as a decision making systems
CO3	3. Designing Dimensional model, Fact table and dimension tables and correlate them usingvarious models like star schema, snow flack schema
CO4	4. Design and development of Business Intelligent Applications

Course Name:-	Web Technology-II
CO1	Know Web technology concepts and use the required tools.
CO2	Classify and explain client side and server side scripting languages and validation techniques.
CO3	Explain database access technologies and state management techniques.
CO4	Write a code to develop real life Web applications using ASP.NET and PHP.

Course Name:-	Advanced Software Technologies
CO1	1. Students will able to understand differences in desktop applications
CO2	2. Students will able to understand Enterprise JavaBeans (EJB) technologies.
CO3	3. Students will able to understand To understand MVC
CO4	4. Student will able to understand different technology related to MVC and technology related to it.
CO5	5. Student will able to develop real hibernate technology can build various kinds of applications based on it.

	INSTRUMENTATION ENGINEERING
	S.Y. B Tech Part-II Sem-IV
Course Name:-	Digital electronics
CO1	To Work with a variety of number systems and numeric representations, including signed and unsigned binary, hexadecimal, 2's complement.
CO2	To introduce basic postulates of Boolean algebra and show the correlation between Boolean expression.
CO3	To introduce the methods for simplifying Boolean expressions.
CO4	To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
Course Name:-	Feedback Control System
CO1	• To understand the use of transfer function models for analysis physical systems and introduce the control system components.
CO2	• To provide adequate knowledge in the time response of systems and steady state error analysis.
CO3	• To accord basic knowledge in obtaining the open loop and closed-loop frequency responses of systems.
CO4	• To introduce stability analysis and design of compensators
CO5	• To introduce state variable representation of physical systems and study the effect of state feedback.
Course Name:-	measurement Electrical and Electronics
CO1	To understand philosophy of measurement.
CO2	To understand different methods analog and digital measurement.
CO3	To study principle of construction and operation of different transducer and dismay methods.
Course Name:-	Elective –II Analytical Sensor
CO1	Ability to understand and analyze Instrumentation systems and their applications to various industries.
Course Name:-	Professional Communication Elective-III
CO1	develop good communication, presentation and report writing skill
Course Name:-	Product Design [Online course]
CO1	Understands modeling of product
CO2	Able to work in team
CO3	Understand importance of documentation
CO4	Understand basic principles of health and safety in project management
T.E. Part-II Sem-VI	
Course Name:-	Power Plant Instrumentation & Unit Operation
CO1	1.Students will able to identify methods of power generation.
CO2	2.Students will able to explain conventional & non conventional energy power plants.
CO3	3.Student will able to describe modes of heat transfer.
CO4	4.Student will able to discuss basics of distillation columns & gas absorptions.
CO5	5.Student will distinguish between extraction, crystallization & drying.
Course Name:-	Control System Design

CO1	1.Student will able to analyze non linear system.
CO2	2.Student will able identify state space representation of continuous & discrete system.
CO3	3.Student will able to analyze stability of discrete system.
CO4	4.Student will able to design discrete time control system.
Course Name:-	Chemical & Analytical Instrumentation
CO1	1.Student will able to discuss chemical analysis.
CO2	2.Student will able to describe flame photometry.
CO3	3.Student will able to summarize NMR. & mass spectrometer.
CO4	4.Student will able to classify chromatography
6	Industrial Automation
CO1	1.Student will able to distinguish between DCS, PLC, PC & field bus.
CO2	2.Student will able to explain PLC Hardware in detail.
CO3	3.Student will able to program PLC to solve industrial problems.
CO4	4.Student will able to describe commissioning and maintenance.
CO5	5.Student will identify SCADA and HMI
Course Name:-	Embedded Instrumentation
CO1	1.Students will able to describe embedded system.
CO2	2.Students will able to explain ARM organization & programmer model.
CO3	3.Students will able to identify ARM instruction set.
CO4	4.Student will able to describe real time operating system.
CO5	5.Students will able to demonstrate programming of ARM
Course Name:-	Mini Project
CO1	1.Students will able to apply knowledge learnt, gain new skills.
CO2	2.Student will able to design instrumentation systems.
CO3	3.Student will able to improve technical and communication skill.
CO4	4.Student will able to organise possible solutions to industrial problems.
B.E. Part-II Sem-VIII	
Course Name:-	Field Instrumentation
CO1	1.Student will able to explain components of digital field bus networks.
CO2	2. Student will able to describe working of Foundation Fieldbus & HART protocols.
CO3	3. Student will able to outline profibus networks
CO4	4. Student will able to explain fiber optic networks.
CO5	5. Student will able to specify use of wireless networks.
Course Name:-	Advanced Process Control
CO1	1.Students will able to know control strategies.
CO2	2.Student will able to design PID controller algorithms.
CO3	3.Students will able to know digital control methods.
CO4	4.Student will able to explain HVAC & access control.
Course Name:-	Project Engineering & Management
CO1	Student will able to know detailed engineering.
CO2	Students will know P & I diagrams and standards for instrumentation identification.
CO3	Student will able to develop engineering documentation.
CO4	Students will able to identify different types of cables and project monitoring techniques.
CO5	Student will able to illustrate installation and commissioning activities.
Course Name:-	Project Phase - II
CO1	1.Students will able to apply knowledge learnt, gain new skills and be aware of current technologies
CO2	2. Student will able to design instrumentation systems.
CO3	3. Student will able to improve technical and communication skill.
CO4	4. Student will able to suggest possible solutions to industrial problems.
CO5	5. Student will able to present a proper report, both orally and in writing on their work experience.
Course Name:-	Elective – II Robotic & Automation
CO1	1.Describe fundamentals of robots
CO2	2.Identify suitable components for robot.
CO3	3. Design signal conditioning for robot.
Course Name:-	Advanced Software Technologies
CO1	1. Students will able to understand differences in desktop applications
CO2	2. Students will able to understand Enterprise JavaBeans (EJB) technologies.
CO3	3. Students will able to understand To understand MVC
CO4	4. Student will able to understand different technology related to MVC and technology related to it.
CO5	5. Student will able to develop real hibernate technology can build various kinds of applications based on it.
	MECHANICAL ENGINEERING
	S.Y. B Tech Part-II Sem-IV
Course Name:-	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

Course Name:-	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
Course Name:-	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
Course Name:-	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
Course Name:-	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
Course Name:-	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).
Course Name:-	Interpersonal 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
T.E. Part-II Sem-VI	
Course Name:-	Industrial Management andOperation Research
CO1	Understand the concepts of Industrial management and operations research approaches.
CO2	Formulate and solve engineering and managerial situations as LPP.
CO3	Formulate and solve engineering and managerial situations as Transportation and Assignment problems.
CO4	Formulate and solve engineering and managerial situations as Decision theory, Network model and Sequencing models.
Course Name:-	Industrial Fluid Power
CO1	Explain and draw different ISO/JIC symbols used in hydraulic and pneumatic circuits.
CO2	Demonstrate hydraulic and pneumatic system components.
CO3	Interpret the hydraulic and pneumatic circuits with their application.
CO4	Explain safety regulations and troubleshooting in hydraulic and pneumatic system.
CO5	Explain fluidics and their application.
Course Name:-	Metrology and Quality Control
CO1	Identify and use various measuring instruments
CO2	Select appropriate instrument for particular feature measurement
CO3	Distinguish and understand quality assurance and quality control
CO4	Use control charts and sampling inspection for manufacturing and service
CO5	Understand the drawings with tolerances and surface finish
Course Name:-	Machine Design – II
CO1	Design machine elements subjected to fluctuating loading.
CO2	Apply principles of design for manufacturing, assembly and material selection in design of machine elements.
CO3	Understand effect of tribological considerations with respect to design.
CO4	Design/select sliding and rolling contact bearing using suitable design data in various mechanical systems.
CO5	Design simple gear box using various types of gears such as spur, helical, bevel and worm gears.
Course Name:-	Internal Combustion Engines
CO1	Demonstrate a basic understanding of engine construction, function of various parts of the engine.
CO2	Understand combustion mechanism.

CO3	Demonstrate importance and functions of various systems on the engine.
CO4	Demonstrate need and methods of engine testing.
CO5	Know the impact of vehicular pollution and ways to reduce or control the pollution.
Course Name:-	**Computer Integrated Manufacturing**
CO1	Understand modern techniques for integrating CAD/CAM in CIM
CO2	Obtain an overview of computer technology in Production Planning and Control.
CO3	Apply classification and coding in Group Technology.
CO4	Elaborate Computer Aided Production Planning and Control.
Course Name:-	**Seminar**
CO1	Have and develop presentation skills.
CO2	Impart knowledge in different aspects of knowledge domains.
CO3	Build confidence and improve communication skills.
CO4	Collect ideas through literature survey about new innovations, analyze and present them.
CO5	Sharpen their personality and intelligence.
Course Name:-	**Workshop Practice VI**
CO1	Select the suitable machining operations and prepare process sheet to manufacture a component and implement the same.
CO2	Control key dimensions on a component using principles of metrology and assembly
Course Name:-	**Mini-Project- II**
CO1	Work in a group on specific assignment.
CO2	Think creatively to come out with feasible solution for engineering real life problem.
CO3	Enculcate habit of lifelong learning
B.E. Part-II Sem-VIII	
Course Name:-	**Mechatronics**
CO1	Understand the importance of integration of Mechanical, Electronics and Control in the design of Mechatronics system
CO2	Define sensor, transducer and understand the applications of different sensors and transducers
CO3	Explain the signal conditioning and data representation techniques
CO4	Write a PLC program using Ladder logic for a given application
CO5	Understand applications of microprocessor, micro controller
CO6	Understand General and Industrial Application of PLC
Course Name:-	**Energy and Power Engineering**
CO1	Demonstrate need of different energy sources and their importance
CO2	Analyze the utilization of solar, wind energy etc.
CO3	Comprehend various equipments/systems utilized in power plants
CO4	illustrate power plant economics.
Course Name:-	**Noise and Vibration**
CO1	Formulate mathematical model to represent mechanical system
CO2	Evaluate vibration parameters of mechanical system
CO3	Analyze vibratory response of mechanical system using classical methods and software tools.
CO4	Measure vibration parameters using modern equipment
CO5	Understand the importance of noise measurement and its relevance in human life
Course Name:-	**Elective III Industrial Engineering**
CO1	Use the various tools and techniques of IE
CO2	Analyze and design new method of performing job
CO3	Measure and estimate standard time for job
CO4	Understand different types of plant layouts
CO5	Interpret job evaluation and merit rating
Course Name:-	**Elective IV Enterprise Resources Planning**
CO1	Explain the Basic structure of ERP systems
CO2	Understand the IT governance with ERP software
CO3	Utilize different ERP modules
CO4	Conduct gap analysis and Select suitable ERP packages.
CO5	Implement ERP package for particular industry
Course Name:-	**Project Phase-II**
CO1	Improve the professional competency and research aptitude in relevant area
CO2	Develop the work practice to apply theoretical and practical tools/techniques to solve real life problems related to industry and current research
	M.Tech Part-I Sem-II
	Thermal Engineering
Course Name:-	**Modeling and Analysis in Thermal Engineering**
CO1	Attempt modeling real life systems of interest in order to predict its dynamic behavior.
CO2	Use simulation tools to determine dynamic response of system following external inputs.
CO3	Understand capabilities and limitations of various numerical and mathematical models.
CO4	Optimization of thermal systems, formulation, optimization methods.
CO5	Deep understanding on the governing equations for convection heat transfer; knowing the dimensionless parameters
Course Name:-	**Mini-Project (Semester II)**
CO1	Identify methods and materials to carry out experiments/develop code.
CO2	Reorganize the procedures with a concern for society, environment and ethics.
CO3	Analyze and discuss the results to draw valid conclusions.
CO4	Prepare a report as per recommended format and defend the work

CO5	Explore the possibility of publishing papers in peer reviewed journals/conference proceedings.

Course Name:-	**Fluid Dynamics**

CO1	Understand and define basic fluid dynamic concept like continuum, surface forces, stress tensor and vector fields, Eulerian and langrangian flow.
CO2	Define the motions of fluid elements and derive continuity equation,stream function and velocity potential.
CO3	Derive and apply Navier-stokes equation to various types of flow systems.
CO4	Apply Boundary layer theory concept, and able to derive solutions by various numerical methods.
CO5	Describe and analyze the different flow, velocity correlation and universal velocity distribution.
CO6	Examine and numerical analysis of PDE and providing techniques for interpreting and analyzing the behavior of numerical schemes.

Course Name:-	**Advanced Refrigeration**

CO1	Formulate and solve vapor compression refrigeration and multi-stage vapor compression systems. CO2 CO3CO4 CO5
CO2	Study and identify various types of refrigerants and their properties., such as zeotropic, azeotropic etc.,
CO3	Illustrate Nomenclature, Refrigerants, alternative refrigerants, CFC/HCFC phase-out regulations, action with lubricating oil, retrofitting, refrigerant blends, effects on refrigeration components.
CO4	Design and analyze vapor absorption system
CO5	select refrigerant control techniques and do piping designing for refrigeration plant

Course Name:-	**Steam and Gas Turbines**

CO1	Illustrate properties of Steam, Draw P-V, T-s, H-s(Mollier) diagrams for steam, Describe Theoretical steam turbine cycle.
CO2	Demonstrate and analyze vortex flow, energy lines and reheat factors of steam turbines. Solve problems of finding performance steam turbine power plant.
CO3	Demonstrate simple Brayton cycle for gas turbine analyze its performance on computer simulation, suggest suitable modification and then analyze it.
CO4	Study and apply various Performance Improvement Techniques in steam and gas Turbines
CO5	Design and suggest and analyze cooling accessories and protective material for steam turbine

Course Name:-	**Research Methodology**

CO1	Understand and Describe importance of research.
CO2	Classify and select appropriate resources for Research.
CO3	Analyze the contents of literature and identify further scope.
CO4	Formulate a Research Problem.
CO5	Develop effective written and oral Presentation skills

	M.Tech Part-II Sem-II
Course Name:-	**Project Stage-II**

CO1	Solve identified technical problem using acquired knowledge and skill.
CO2	Use latest equipment, instruments, software tools, infrastructure and learning resources available to solve the identified project problem.Procure resources, if required.
CO3	Interpret theoretical/experimental findings using available tools
CO4	Compare the results obtained with results of similar studies
CO5	Draw conclusions based on the results.

	Design Engineering
	M.Tech Part-II Sem-II
Course Name:-	**Project Stage-II**

CO1	Solve identified technical problem using acquired knowledge and skill.
CO2	Use latest equipment, instruments, software tools, infrastructure and learning resources available to solve the identified project problem.Procure resources, if required.
CO3	Interpret theoretical/experimental findings using available tools
CO4	Compare the results obtained with results of similar studies
CO5	Draw conclusions based on the results.

	FIRST YEAR ENGINEERING (GROUP A)
	F.Y. B Tech Part-I Sem-II
Course Name:-	**Engineering Mathematics-II**

CO1	Understand Complex number and hyperbolic function and their relations.
CO2	Solve ordinary differential equations of first order and first degree.
CO3	Solve linear differential equation with constant coefficients.
CO4	Develop Fourier series expansion of different periodic function.
CO5	Compute and analyze gradient, divergence and curl of vector fields.
CO6	Solve vector integration by using different theorems.

Course Name:-	**Engineering Chemistry**

CO1	Define and explain basic laws, principles and ideas of physics related to engineering curriculum.
CO2	Understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, and Quantum mechanics.
CO3	Understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms the base of many modern devices and technologies.

Course Name:-	**Engineering Mechanics**

CO1	Students are able to apply knowledge of applied mechanics to solve various Engineering problems.
CO2	Students understand various force system and its effects on static and moving bodies.
CO3	Students understand concepts of equilibrium.
CO4	Students understand geometrical properties of plain laminae.
CO5	Students understand dynamics of rigid bodies.

Course Name:-	**Computer Programming in C**

CO1	Student should be aware of c programming environment.
CO2	To demonstrate the concept of problem solving skills.
CO3	Student should demonstrate, analyze and debug the c program.
CO4	Understand and analyze the c programs for various problem statements.
Course Name:-	**Basic Electrical and Electronics Engineering**
CO1	Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
CO2	Provide knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
CO3	Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as p-n junction diode, Zener diode. To apply the basics of diode to describe the working of rectifier circuitssuch as Full and half wave rectifiers.
CO4	Sketch and explain the basic block of communication system. List and explain the different number system. Solve examples on converting one form of number system to another form. State Boolean laws and theoremsand logic gates.
	FIRST YEAR ENGINEERING (GROUP B)
	F.Y. B Tech Part-I Sem-II
Course Name:-	**Engineering Mathematics-II**
CO1	Understand Complex number and hyperbolic function and their relations.
CO2	Solve ordinary differential equations of first order and first degree.
CO3	Solve linear differential equation with constant coefficients.
CO4	Develop Fourier series expansion of different periodic function.
CO5	Compute and analyze gradient, divergence and curl of vector fields.
CO6	Solve vector integration by using different theorems.
Course Name:-	**Engineering Physics**
CO1	Define and explain basic laws, principles and ideas of physics related to engineering curriculum.
CO2	Understand Engineering problems based on the principle of Oscillation, Ultrasonics, Optics, Laser, Fibre optics, Nuclear physics, and Quantum mechanics.
CO3	Understand Fundamental of Electrodynamics, Semiconductor, Dielectric, Magnetic and Superconducting materials which forms the base of many modern devices and technologies.
Course Name:-	**Engineering Graphics**
CO1	Students will understand BIS conventions of drawing and geometrical constructions; also understand the concept of first angle & third angle method of projection.
CO2	The students will understand & draw projection of lines, planes & solids. Students will draw orthographic projection, sectional views and isometric projection of diff. engineering components.
CO3	Students will draw sections of solids of different surfaces.
CO4	Students will able to understand about the basic Industrial requirement of drawing.
Course Name:-	**Communication Skills**
CO1	Students understand the concept of communication and its process & identify the difference between verbal and non-verbal communication.
CO2	Students know the correct usage of English grammar & pronunciation of sounds with proper stress and intonation.
CO3	Students know LSRW skills and apply them to improve communication skills.
Course Name:-	**Energy and Environment Engineering**
CO1	To understand basic laws, principles and Environment aspect of conventional and non non-conventional sources. And understand advantages and disadvantages to protect the environment.
CO2	To acquire the knowledge of Methods and Techniques of energy conservation in ventilation, air conditioning, Pumps, fans, blowers, Light and Lightening techniques
CO3	To Understand Sources, effects, and control of Air Pollution, water Pollution, soil Pollution, Noise Pollution and Radioactive materials
Course Name:-	**Basic Civil and Mechanical Engineering**
CO1	Students are able to apply knowledge of Civil Engineer in its various branches according to building material properties.
CO2	Students are understand Principle of planning, building bye-laws and component of building.
CO3	Students are understand application of surveying in actual practice to prepare plan or map.