

VIKAS COLLEGE OF ENGINEERING AND TECHNOLOGY

(Sponsored by SARASWATHI VIDYA PEETAM)

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada)

Certified by ISO 9001:2015: Accredited by NAAC with 'B+'Grade.

NUNNA-521212, Vijayawada Rural, NTR Dt., A.P. India.

E-mail-principal.vcet@gmail.com, Website: <http://www.vikasinstitutionsnunna.org/>



2.6.1 Program outcomes, program specific outcomes and course outcomes for all programs offered by the Institution are stated and displayed on website and communicated to teachers and students.

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**Department of Agricultural Engineering Courses
Outcomes(R20)**

Agricultural Courses Outcomes(R20)

B.Tech 1 st Sem		
Course Name	Course Outcomes	
BS1101- Mathematics-I	CO1	Utilize mean value theorems to real life problems
	CO2	Solve the differential equations related to various engineering fields
	CO3	Familiarize with functions of several variables which is useful in optimization
	CO4	Apply double integration techniques in evaluating areas bounded by region
	CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems
HS1101-English	CO1	Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
	CO2	Ask and answer general questions on familiar topics and introduce oneself/others
	CO3	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
	CO4	Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
	CO5	Form sentences using proper grammatical structures and correct word forms.
BP103T -Engineering Workshop and IT Workshop)	CO1	Assemble and disassemble components of a PC
	CO2	Construct a fully functional virtual machine, Summarize various Linux operating system commands
	CO3	Secure a computer from cyber threats, Learn and practice programming skill in Github, Hacker rank, Code chef, Hacker Earth, etc
	CO4	Recognize characters & extract text from scanned images, Create audio files and podcasts
	CO5	Create video tutorials and publishing, Use office tools for documentation, Build interactive

		presentations, Build websites, Create quizzes & analyze responses.
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B.Tech 2nd Sem		
Course Name	Course Outcomes	
MATHEMATICS - II (BS)	CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications
	CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel
	CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms
	CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals
	CO5	apply numerical integral techniques to different Engineering problems
	CO6	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations
BS1210- Engineering Chemistry	CO1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.
	CO2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
	CO3	Synthesize nonmaterial's for modern advances of engineering technology. Summarize the techniques that detect and measure changes of state of reaction. Illustrate the commonly used industrial materials.
	CO4	Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced. Study alternate fuels and analyze flue gases.
	CO5	Analyze the suitable methods for purification and treatment of hard water and brackish water.
ENIGINEERING MECHANICS (BS1204)	CO1	The student should be able to draw free body diagrams for FBDs for particles and rigid bodies in plane and space and problems to solve the unknown forces, orientations and geometric parameters.
	CO2	He should be able to determine centroid for lines, areas and center of gravity for volumes and their composites.

	CO3	He should be able to determine area and mass movement of inertia for composite sections
	CO4	He should be able to analyze motion of particles and rigid bodies and apply the principles of motion, work energy and impulse – momentum
PROGRAMMING FOR PROBLEM SOLVING USING C (ES1201)	CO1	To write algorithms and to draw flowcharts for solving problems
	CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
	CO3	To use different operators, data types and write programs that use two-way/ multi-way selection
	CO4	To select the best loop construct for a given problem
	CO5	To design and implement programs to analyze the different pointer applications
	CO6	To decompose a problem into functions and to develop modular reusable code
	CO7	To apply File I/O operation
ES1103- ENGINEERING DRAWING	CO1	The student will learn how to visualize 2D & 3D objects
ES1202- PROGRAMMING FOR PROBLEM SOLVING USING C LAB	CO1	Gains Knowledge on various concepts of a C language
	CO2	Able to draw flowcharts and write algorithms.
	CO3	Able design and development of C problem solving skills
	CO4	Able to design and develop modular programming skills.
	CO5	Able to trace and debug a program
BS1211- ENGINEERING CHEMISTRY LABORATORY	CO1	The students entering into the professional course have practically very little exposure to lab classes.
	CO2	The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis.
	CO3	Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
MACHINE DRAWING AND COMPUTER GRAPHICS LABORATOR(ES1220)	CO1	Practical skills on preparing manual drawings of model isometric view of the objects, machine components, assembly drawings of different joints.
	CO2	Practice on drawing of missing views; principles of dimensions and their methods

	CO3	Practical skills on sectioning concepts and its drawing & mechanical parts.
	CO4	Practical skills on types of rivet heads & parts, square headed and hexagonal nuts, bolts, different types lock nuts, stands machine screws.
	CO5	Practical knowledge on components of CAD and its hardware requirements, terms & command in Auto CAD software for practice.
	CO6	Practical skills on drawing of riveted joints and thread fasteners, computer graphics in agricultural engineering applications, practice of commands in Auto CAD software.
	CO7	Practical skills on 2-D drawings and projects in Auto CAD.

B.Tech 3rd Sem		
MATHEMATICS-III	CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence
	CO2	Estimate the work done against a field, circulation and flux using vector calculus
	CO3	Apply the Laplace transform for solving differential equations
	CO4	Find or compute the Fourier series of periodic signals
	CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
	CO6	Identify solution methods for partial differential equations that model physical processes
PROPERTIES AND STRENGTH OF MATERIALS(ES)	CO1	Skill development on basic properties of engineering materials and their uses, testing of materials
	CO2	Knowledge development on properties and application of difference of concrete, varieties, distempers, glass, rubber and plywood, plastics, iron-based materials, alloys etc.,
	CO3	Development of skill on stress – strain analysis of beams under different types of loading patterns.
	CO4	Acquaintance of skill on Euler's theory and buckling load, analysis on columns & different types of

		columns
	CO5	Skill development on different types of joints (Riveting), welding analysis cantilever, fixed, continuous beams, theory of moments and their analysis.
FARM POWER AND TRACTOR SYSTEMS(PC)	CO1	Skill development on farm power sources classification I.C engine components & construction, operating systems
	CO2	Skill development on fuel supply ignition, cooling & lubrication electrical ignition, fuels & their properties, governing systems of IC engines, power transmission, clutches & its applications
	CO3	Acquaintance of knowledge on clutch types, concepts & principles, single & multiple plates clutches, working mechanism, gear theory and principles, differential unit of its functions, final drive & its applications.
	CO4	Skill development on principles of fluid coupling & torque connector, brakes principles, classification & friction concepts of hydraulic system in factors.
	CO5	Skill development on tractor powers outlets, P.T.O and its applications, Tractor testing and its main components, CG estimation, Tractor chassis its mechanics.
FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS LAB(ES)	CO1	Imparting practical skills on determination of meta centric height and Bernoulli's theorem.
	CO2	Exposure to practical skills on measurement of discharge with venture meter and pilot tubes.
	CO3	Acquiring practical skills on determining discharge coefficient of rectangular, triangular and trapezoidal weir and orifices.
	CO4	Imposing practical skills on flow measurement Broad crested weirs and open channels.
	CO5	Imposing practical skills on determination of head losses in pipes, roughness coefficient of open channels.
	CO6	Practical exposes on determination of velocity and pressure in open channels, construction of flow net problems on flow nets..
FIELD OPERATIONS AND MAINTENANCE OF TRACTORS LAB(PC)	CO1	Improved practical skills on air kind fuel filtration systems, lubrication system and their maintenance in tractors.
	CO2	Practical skills improvement on maintenance of

		transmission and radiators cooling systems in tractor.
	CO3	Practical skills development on maintenance of tractor ignition and hydraulic systems.
	CO4	Practical knowledge on periodical maintenance of tractors, emission of smoke, clutch and brake system maintenance
	CO5	Practical skill development on maintenance of train machinery and implements
	CO6	Practical knowledge on tractor on-off practice of tractors
CONSTITUTION OF INDIA(MC)	CO1	Understand historical background of the constitution making and its importance for building a democratic India.
	CO2	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
	CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
	CO4	Analyze the decentralization of power between central, state and local self-government.
	CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Pachayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission

B.Tech 4th Sem		
Course Name	Course Outcomes	
HEAT AND MASS TRANSFER(PC)	CO1	Skill development on principles of heat and mass transfer, steady state heat transfer & its analysis, measurement of thermal conducting of pleasure & composite walls, tubes and spheres, multilayer tubes.
	CO2	Skill development on conduction principles of different materials in parallel, combined convection and conduction, concept of insulation.

	CO3	Skill development on conduction, convection and radiation analysis of heat and mass transfer, different laws on radiation theory.
	CO4	Imparting skills on unsteady state analysis of heat transfer in fins, free & force convection, cooling theories and principles.
	CO5	Skill development on theory and principles of heat exchanges, their analysis, frick's law of mass transfer coefficients, Reynolds analogy..
GROUND WATER HYDROLOGY, WELL AND PUMPS(PC)	CO1	Skill development on principles of ground water resources development, different acquaintance and their principles.
	CO2	Imparting knowledge on theory of open well hydraulics and drilling methods.
	CO3	Skill development on aquifers characteristics under steady and unsteady state conditions, multiples well systems for coastal areas.
	CO4	Knowledge development to students on artificial ground water recharge classification of indigenous pumps, solar pumps, wind mill pumps etc.,
	CO5	Skill development on principles of Centrifugal pumps, principles & characteristics, High lift pumps, mixed flow pumps and vertical turbine pump sets.
THEORY OF STRUCTURES(PC)	CO1	Skill development on RCC theory and practice of principles, stress – Strain analysis.
	CO2	Skill development on single, double reinforced sections, their theory & principles, shear stress analysis.
	CO3	Acquaintance of knowledge on design principles of shear reinforcement, anchorage of bars & analysis
	CO4	Skill development on theory and principles of design of one – way reinforced beams/slabs, two way slabs and columns.
	CO5	Skill development on principles of auxiliary loaded columns, foundations retaining walls, stability analysis.
SOIL MECHANICS(PC)	CO1	Skill development on principles of soil mechanics soil classification, stresses in soils.
	CO2	Skill development on Bousinesq's analysis for vertical pressure applications & western guard's analysis for point load applications
	CO3	Acquaintance of knowledge on shear stress analysis, Mohr's stress circle, measurement of shear strength.
	CO4	Skill development on soil consolidations theory and

		principles.
	CO5	Skill development on earth pressure and its effects on soil stability of slopes.
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS(HSS)	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product.
	CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
	CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
	CO4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
	CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

B.Tech 5th Sem		
Course Name	Course Outcomes	
FARM MACHINERY AND EQUIPMENT – I(PC)	CO1	Apply Principles of Farm Mechanization to calculate field capacities and cost of cultivation
	CO2	Calculate the forces acting on tillage tools, Draft and Unit draft.
	CO3	Explain Earth moving Equipment.
	CO4	Analyze Seeding methods, Plant protection Equipment
	CO5	Discuss the features of Transplanting machinery and Fertilizer application equipment
SURFACE WATER HYDROLOGY (PC)	CO1	Analyze probability of rainfall, Return Period, Plotting position
	CO2	Determine net effective rainfall, Peak runoff and Peak runoff rate
	CO3	Discuss the factors affecting flood hydrographs, hydrograph Separation for simple and complex storms.
	CO4	Describe method of superposition, S-Curve and determine duration graphs.
	CO5	Use the Concepts of Flood raining.
POST HARVEST	CO1	Apply principles of Bond's law, Kick's law,

ENGINEERING OF CEREALS, PULSES AND OILSEEDS(PC)		Rittinger's law for size reduction
	CO2	Explain the features and application of Material Handling equipment
	CO3	Explain the concepts of Dryers
	CO4	Use CFTRI and Jadavpur methods for Mixing and Milling Practices
	CO5	Apply the principles of milling wheat and Oil seeds
SEED PROCESSING AND STORAGE ENGINEERING (Professional Elective - I)(PE)	CO1	Estimate the moisture content by using different methods.
	CO2	Calculate drying air temperature and air flow rate, air pressure within the grain bed.
	CO3	Explain the causes for the spoilage in storage and calculate the parameters associated.
	CO4	Design grain storage structures
	CO5	Analyze Grain handling equipment.
GREENHOUSE TECHNOLOGY (Professional Elective - I)(PE)	CO1	Classify the greenhouses based on different parameters
	CO2	Identify the required environmental factors for crop growth
	CO3	Analyze the Natural and forced ventilation, summer and winter cooling systems
	CO4	Explain Greenhouse irrigation systems.
	CO5	Describe protected Agricultural techniques
TRACTOR DESIGN AND TESTING (Professional Elective - I) (PC)	CO1	Analyze parameters for balanced design of a tractor
	CO2	Explain the Elements of mechanical power transmission in Agricultural tractor
	CO3	Design seat controls of an agricultural tractor
	CO4	Design gear box
	CO5	Determine turning space, turning radius and other parameters associated
ELECTRICAL CIRCUITS LAB(PC)	CO1	Apply various theorems
	CO2	Determination of self and mutual inductances
	CO3	Two port parameters of a given electric circuits

	CO4	Draw locus diagrams
	CO5	Draw Waveforms and phasor diagrams for lagging and leading networks
SOFT SKILLS(SOC)	CO1	Problem solving regards numerical methods in Linear Algebra
	CO2	Analyze about Eigen values and Eigenvectors
	CO3	Differentiation and Integration Finite difference formula using Taylor series.
	CO4	Differentiation of Lagrange polynomials, Simpson's rule, Gauss-quadrature rule, Romberg method
	CO5	Solving of Partial Differential Equations
: PROFESSIONAL ETHICS AND HUMAN VALUES(MC)	CO1	Judge the concepts of human values.
	CO2	Justify knowledge about the principles of engineering ethics.
	CO3	Interpret engineering as social experimentation
	CO4	Realize engineers' responsibility for safety and risk.
	CO5	Discuss about the engineers' rights and responsibilities

B.Tech 6th Sem		
Course Name	Course Outcomes	
SOIL AND WATER CONSERVATION ENGINEERING(PC)	CO1	Calculate Peak run off, time of conservation
	CO2	Estimate soil loss by using Universal Soil Loss equation and modified soil loss equation,
	CO3	Discuss factors affecting wind erosion, mechanics of wind
	CO4	Design contour bunds, graded bunds and bench terraces
	CO5	Design vegetated water ways, WH Structures
FARM MACHINERY AND EQUIPEMNT – II(PC)	CO1	Describe Crop harvesting machinery
	CO2	Analyze the Power operated vertical conveyer reapers
	CO3	Apply the threshing principles for all types of threshers
	CO4	Analyze the factors affecting the harvesters.
	CO5	Explain the features of cotton harvesting equipment.

AGRICULTURAL PROCESS ENGINEERING(PC)	CO1	Discuss different types of Material handling devices.
	CO2	Analyze the effectiveness and mixing index for granular solids, mixing indices
	CO3	Explain Aerodynamics of Agricultural product .
	CO4	Estimate moisture content in wet basis and dry basis for different types of grains
	CO5	Apply milling principles for wheat, pulses and oil seeds.
FOOD PACKAGING TECHNOLOGY (Professional Elective - II)(PE)	CO1	Apply principles of packaging for cost effective packaging
	CO2	Estimate the Shelf life of processed foods
	CO3	Describe different types of packaging materials.
	CO4	Analyze the different techniques used for packaging of milk, fruits and meat.
	CO5	Explain various container making processes
WATERSHED MANAGEMENT(PE)	CO1	Plan for watershed development
	CO2	Analyze the factors affecting the watershed management.
	CO3	Explain rainwater conservation technologies.
	CO4	Estimate the Effect of cropping systems, land management and cultural practices on watershed hydrology
	CO5	Prepare project proposal for watershed management program including cost-benefit analysis.
HUMAN ENGINEERING AND SAFETY (Professional Elective - II)	CO1	Design workspace for standing and seated workers.
	CO2	Interpret the functions of the skeletal and muscular systems
	CO3	Apply Biometrics and energy for muscle contraction for the design of Hand tools.
	CO4	Estimate the Physical work capacity
	CO5	Calculate sound, the nature of sound, damages due to noise
SOIL AND WATER CONSERVATION ENGINEERING LAB(PC)	CO1	Estimation of soil and water conservation practices.
	CO2	Estimation using erosivity index and erodibility index
	CO3	Measurement of irrigation water with H-Flume

	CO4	Estimate the discharge rate of water by using current meter and water meter.
FARM MACHINERY AND EQUIPMENT LAB(PC)	CO1	Study of various implements and functional element
	CO2	Evaluation of field efficiencies and fuel efficiencies.
	CO3	Evaluate performance of various agricultural implements and machines.
	CO4	Design and calibration of seed drills and matching mechanism
AGRICULTURAL PROCESS ENGINEERING LAB(PC)	CO1	Conducts the procedure, calculation of uniformity and milling index.
	CO2	Design the procedural calculation of cyclone and pneumatic separation.
	CO3	Solve the problems on psychometric chart, definition and various loss on site reduction.
	CO4	Conduct the performance evaluation of hammer and attribution mills.
STRUCTURAL DESIGN WITH ANSYS(SOC)	CO1	Design of connections, structural steel members in tension, and compression and bending.
	CO2	Analyze singly and doubly reinforced sections, Shear, Bond and Torsion.
	CO3	Design of Reinforced concrete Cantilever and Counter fort Retaining Walls
	CO4	Design of Flat Slabs with and without drops by Direct Design Method of IS code.
	CO5	Design of Eccentric Shear and Moment Resisting connections.
EMPLOYABILITY SKILLS(MC)	CO1	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
	CO2	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
	CO3	Analyze, summarize and present information in quantitative forms including table, graphs and formulas
	CO4	Understand the core competencies to succeed in professional and personal life
	CO5	Learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc.
B.Tech 7th Sem		

Course Name	Course Outcomes	
IRRIGATION AND DRAINAGE ENGINEERING (Professional Elective - III)(PE)	CO1	Explain the terminology related to Irrigation and calculate Soil moisture by different methods.
	CO2	Determine infiltration under check basin conditions and adaptability
	CO3	Design irrigation canals using Lacey's and Kennedy's theories.
	CO4	Describe the factors affecting drainage requirement, drainage coefficient based on the given criteria
	CO5	Design subsurface drains under Steady State conditions.
PRODUCTION TECHNOLOGY OF AGRICULTURAL MACHINERY (Professional Elective - III)(PE)	CO1	Choose appropriate cutting tool material for a given application
	CO2	Explain CNC tooling
	CO3	Calculate limits, fits & tolerances.
	CO4	Apply the relevant motion control system of CNC machine for a given application.
	CO5	Develop Part programmer for a given product.
FOOD PLANT DESIGN AND MANAGEMENT (Professional Elective - III)(PE)	CO1	Explain the principles of plant layout.
	CO2	Select a suitable plant layout for a given product.
	CO3	Use principal considerations for plant location and design of layout
	CO4	Describe the design criteria of plant building
	CO5	Estimate Cost indices, total product cost.
DESIGN OF SOIL AND WATER CONSERVATION AND FARM SYSTEMS (Professional Elective - IV)(PE)	CO1	Analyze types of flow, state of flow, regimes of flow.
	CO2	Estimate runoff by using Parshall flume, H-Flume and weirs, water stage recorders, straight drop spill way-general description.
	CO3	Design Chute spillway and SAF stilling basic
	CO4	Design trapezoidal notch fall and siphon well drop type of canal falls.
	CO5	Analyze different components of diversions head works.
FOOD PROCESS EQUIPMENT DESIGN (Professional Elective - IV)(PE)	CO1	Apply design engineering principles for process Equipment Design
	CO2	Design Food Process equipment.
	CO3	Design high pressure monobolic and multilayer vessels.
	CO4	Analyze the design Parameters of the Conveyors, dryers and other processing equipment.

	CO5	Determine process efficiency, energy utilization and cost.
DESIGN OF AGRICULTURAL MACHINERY (Professional Elective - IV)(PE)	CO1	Analyze the general considerations in machine design.
	CO2	Calculate the design Parameters of socket, spigot cotter joint and Knuckle joint.
	CO3	Choose appropriate levers and springs for a given application
	CO4	Design shafts and keys for the specified conditions.
	CO5	Design Tillage equipment.
MICRO IRRIGATION ENGINEERING (Professional Elective - V)(PE)	CO1	Explain the concept of Sprinkler Irrigation and its components.
	CO2	Discuss Precipitation profiles and Moisture distribution patterns, sprinkler spacing's.
	CO3	Design Sprinkler system, layout, laterals and mains.
	CO4	Describe drip Irrigation and its components.
	CO5	Plan for installation of drip irrigation system.
Subject: MECHATRONICS IN AGRICULTURAL ENGINEERING (Professional Elective - V)	CO1	Describe various mechatronics systems, measurement systems, sensors and transducers.
	CO2	Explain the functionality of solid state electronic devices.
	CO3	Identify the components in the design of electro mechanical systems.
	CO4	Apply the concepts of digital electronics and applications of PLCs for control.
	CO5	Analyze the system interfacing, data acquisition and design of mechatronics systems
DAIRY AND FOOD ENGINEERING (Professional Elective - V)(PE)	CO1	Estimate the physical and chemical properties of milk, water content, acidity, pH, developed acidity.
	CO2	Analyze the parameters that influence Pasteurization
	CO3	Describe emulsification and types of emulsions
	CO4	Estimate the carbohydrates, protein, lipids, minerals, vitamins in food product.
	CO5	Analyze the factors influencing rate of evaporation, thermodynamics of evaporation, and circulation in Evaporators.
UNIVERSAL HUMAN VALUES: 2 UNDERSTANDING HARMONY (Humanities and Social Science)	CO1	Analyze Principles of Solar Radiation.
	CO2	Apply solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.
	CO3	Apply Principles of bio-conversion.

Elective)(HSS)	CO4	Analyze Geothermal Energy techniques.
	CO5	Discus Direct Energy Conversion
COMPUTATIONAL FLUID DYNAMICS WITH FLUENT(SOC)	CO1	Explain elementary details and numerical techniques for solving various engineering problems involving fluid flow.
	CO2	Study about finite difference applications in heat conduction and convection.
	CO3	Apply finite difference for flow modeling.
	CO4	Understand the concepts of finite volume method.
	CO5	Understand the concepts of finite element method applied to heat transfer problems
B.Tech 8th Sem		
Course Name	Course Outcomes	
MANAGEMENT OF CANAL IRRIGATION SYSTEM	CO1	Apply the knowledge on canal classification and its alignment.
	CO2	Determine duty, delta, base period relationships and canal capacity.
	CO3	Design channels using Kennedy's theory and Lacey's regime theory.
	CO4	Differentiate between lined and unlined channels.
	CO5	Explain different irrigation structures.
POST HARVEST ENGINEERING OF HORTICULTURAL CROPS	CO1	Explain about the properties and factors affecting quality of fruits and vegetables.
	CO2	Classify post harvest operations involved in horticulture processing.
	CO3	Identify preservation techniques for processed foods.
	CO4	Apply the advanced packaging technology in food preservation.
	CO5	Identify post harvest disorders in horticultural produce.
INFORMATION TECHNOLOGY FOR LAND AND WATER MANAGEMENT	CO1	Analyze Information Technology (IT) and its application potential
	CO2	Discuss about application and production of multimedia, internet application tools and web technology
	CO3	Development of database concept for effective natural resources management.
	CO4	Apply agricultural information management systems.
	CO5	Application of decision support systems, multi sensor data loggers.

THEORY OF MACHINES	CO1	Analyze element, link, pairs. kinematics of chains and pairs
	CO2	Apply helical, spiral, bevel and worm gear. Simple, compound, reverted and epicyclical mechanisms
	CO3	Estimate the length of belt, power transmitted, velocity ratio, belt size for flat and v-belts
	CO4	Discuss Effect of friction, controlling force, curves, sensitiveness, stability, hunting, Isochronisms', power and effort of a governor.
	CO5	Apply Partial primary balancing of reciprocating masses.
INSTRUMENTATION AND PROCESS CONTROL IN FOOD INDUSTRY	CO1	Estimate Temperature and temperature scales
	CO2	Analyze the different methods of liquid level measurement
	CO3	Estimate the moisture content, specific gravity, measurement of humidity
	CO4	Discuss simple system analysis, dynamic behavior of simple process
	CO5	Apply Temperature control, electronic controllers, flow ratio control, atmosphere control
LANDSCAPE IRRIGATION DESIGN AND MANAGEMENT	CO1	Discuss landscape irrigation- hose irrigation system, quick release coupling system
	CO2	Incorporate modern methods of landscape irrigation- popup sprinklers, spray pop-up sprinkler, shrub adopter.
	CO3	Estimation of Modern methods of landscape irrigation- popup sprinklers, spray pop-up sprinkler, shrub adopter.
	CO4	Apply Automation system for landscape irrigation
	CO5	Design of modern landscape irrigation systems
TRACTOR SYSTEMS AND CONTROLS	CO1	Analyze functions of power transmission system and clutch system
	CO2	Discuss Gear Box – Gearing theory, principle of operation, gear box types.
	CO3	Apply principle of operation, construction, calculation for braking torque.
	CO4	Familiarization with system the Hydraulic adjustments and ADDC
	CO5	Analyze the importance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stability especially at turns.
FOOD QUALITY AND	CO1	Estimate Measurement of color, flavor, consistency, viscosity, texture and their relationship with food

CONTROL		quality
	CO2	Analyze sampling: purpose, sampling techniques, sampling procedures for liquid, powdered and granular materials.
	CO3	Interpretation of sensory results. Instrumental method for testing quality.
	CO4	Detection of adulteration and examination of various food products
	CO5	Discuss about Food Safety Management Systems GAP, GHP, GMP, Hazards and HACCP
FLOODS AND CONTROL MEASURES	CO1	Estimation and cause of floods.
	CO2	Discuss flood forecasting. Flood routing - channel routing, Muskingum structural and nonstructural measures of flood control.
	CO3	Analyze the Gully erosion and its control structures.
	CO4	Design and construction of earthen dam, stability of earthen embankments against failure by tension
	CO5	Discuss about Subsurface dams - site selection and constructional features
BIO-ENERGY SYSTEMS: DESIGN AND APPLICATIONS	CO1	Analyze fermentation processes and its general requirements.
	CO2	Discuss Biomass Production.
	CO3	Apply Biomass preparation techniques for harnessing.
	CO4	Discuss about Biomass preparation techniques for harnessing.
	CO5	Apply shaft power generation, thermal application and economics
AQUACULTURAL ENGINEERING	CO1	Analyze fresh water, brackish water and marine farms.
	CO2	Estimation of area of regular and irregular plane surfaces.
	CO3	Plan for fish ponds, layout planning, materials planning, manual planning, comparison of square and rectangular ponds, large and small ponds.
	CO4	Plan for construction of coastal aqua farms. Brackish water fish farms- tide fed, pump fed farms.
	CO5	Discuss about pumps purpose of pumping, types, selection of pump, total head, horse power calculation. Filters- types and constructions.
PRECISION FARMING TECHNIQUES FOR	CO1	Analyze the importance of agro climatic factors available inside of green house

PROTECTED CULTIVATION	CO2	Discuss about controlling of greenhouse environment factors by using active devices
	CO3	Design and installation of micro irrigation system inside the greenhouse
	CO4	Optimize temperature and relative humidity in green house.
	CO5	Select Crops for green house cultivation
	WASTELAND DEVELOPMENT	CO1
CO2		Analyze about conservation structures.
CO3		Discuss the reclamation of water logged and salt – affected lands.
CO4		Interpret the impact of land degradation, reclamation and rehabilitation.
CO5		Prepare proposal for wasteland development and benefit-cost analysis.
FARM MACHINERY DESIGN AND PRODUCTION	CO1	Explain the basic concept of machine design.
	CO2	Apply principles of design to mechanical power transmission elements such as shafts, keys & couplings, bearings.
	CO3	Apply principles of design in designing farm machinery implements
	CO4	Explain the advanced manufacturing techniques in Production.
	CO5	Explain Industrial lay-out planning.
TESTING AND EVALUATION OF TRACTORS AND FARM EQUIPMENT	CO1	Testing of agricultural machines
	CO2	Testing of Sub-soiler, laser land leveler, Rotavator, Cultivator, Disc Harrow, Seed cum fertilizer drill and planters.
	CO3	Testing of manual and power operated weeders, reaper and thresher.
	CO4	Testing of Combine harvesters. Plant protection machines
	CO5	Testing of farm tractor.
EARTH MOVING MACHINES	CO1	Explain Engineering fundamentals of Earth Moving Machines.
	CO2	Apply Principles of mechanisms in Crawler mounted tractors and Dump trucks.
	CO3	Select suitable equipment for Land cleaning and reclamation.
	CO4	Discuss the role of Earth diggers and ditches.
	CO5	Analyze land development machines on Economic

		aspects.
SPRINKLER AND MICRO IRRIGATION SYSTEMS	CO1	Explain scenario, types and different components of sprinkler irrigation system.
	CO2	Evaluate performance and head losses calculation in sprinkler irrigation system.
	CO3	Explain about various micro irrigation systems and components of drip irrigation system.
	CO4	Evaluate performance and head losses calculation in drip irrigation system.
	CO5	Identify proper method for maintenance of emitter and apply fertilizer through drip irrigation system.
MINOR IRRIGATION AND COMMAND AREA DEVELOPMENT	CO1	Analyze the Factors affecting performance of irrigation projects
	CO2	Design lift irrigation systems
	CO3	Explain Components, need, scope of command area development
	CO4	Use remote sensing techniques for CAD works and enhancing water productivity
	CO5	Plan and layout the water Conveyance systems and determine Storage Capacity of Tanks.
DEVELOPMENT OF PROCESSED FOOD PRODUCTS	CO1	Analyze the unit operations and equipment for processing
	CO2	Development of new products
	CO3	Extraction of oil and refining of oil.
	CO4	Study about value added products from fruits, vegetables and spices, Canned foods.
	CO5	Preparation of Practical Process design and process flow chart
ENGINEERING PROPERTIES OF AGRICULTURAL PRODUCE	CO1	Calculate the basic engineering properties of a biological material.
	CO2	Analyze the flow behavior of biological materials and force deformation.
	CO3	Analyze the Maxwell and Kelvin model equations in the rheology for important biological materials.
	CO4	Explain the applications of frictional and aerodynamic properties in the design of processing equipment
	CO5	Explain the applications of electrical and thermal properties in the design of processing equipment

AGRICULTURAL STRUCTURES AND ENVIRONMENTAL CONTROL	CO1	Plan and layout farmstead.
	CO2	Design farm structures
	CO3	Design grain storage go downs, Bag storage structures, Shallow and Deep bin
	CO4	Analyze the sources of water supply, norms of water supply for human beings and animals
	CO5	Measure environmental parameters and cooling load of a farm building
FOOD WASTE AND BY-PRODUCTS UTILIZATION	CO1	Analyze the basic applications of agro industries and by- products utilization, importance of rice husk and their uses and rice husk combustion
	CO2	Describe the manufacturing of alcohol processes and production of furfural
	CO3	Explain by-products of coconut, mango, cashew nut and banana
	CO4	Explain about the feed manufacturing equipments, paper making process and different types of sugarcane by-products.
	CO5	Justify the biological treatment with their advantages and disadvantages.

DEPARTMENT OF CIVIL ENGINEERING Courses
Outcomes(R20)

CIVIL ENGINEERING Courses Outcomes(R20)

B.Tech 1 st Sem	
Course Name	Course Outcomes
Engineering Physics(Integrated)(Theory & Lab)	<p>CO1 Explain the need of coherent sources and the conditions for sustained interference (L2). Identify applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2). Classify ordinary polarized light and extraordinary polarized light (L2) The different realms of physics and their applications in both scientific and technological systems are achieved through the study of wave optics.</p>
	<p>CO2 Explain various types of emission of radiation (L2). Identify lasers as tools in engineering applications (L3). Describe the construction and working principles of various types of lasers (L1). Explain the working principle of optical fibers (L2). Classify the optical fibers based on refractive index profiles and modes of propagation (L2). Identify the applications of optical fibers in medical, communication and other fields (L2). Apply the fiber optic concepts in various fields (L3).</p>
	<p>CO3 Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Clausius- Mosti relation in dielectrics (L2). Classify the magnetic materials based on susceptibility and their temperature dependence (L2). Explain the applications of dielectric and magnetic materials (L2). Apply the concept of magnetism to magnetic devices (L3).</p>
	<p>CO4 Explain sound waves and its propagation/absorption of construction material used in design of buildings (L2). Analyze acoustic parameters of typical materials used in buildings (L4). Recognize sound level disruptors and their application in architectural acoustics (L2). Identify the use of ultrasonics in diversified fields of engineering (L3)</p>
	<p>CO5 Interpret various crystal systems (L2) and Analyze the characterization of materials by XRD (L4). Identify the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique (L3). Analysis of structure of the crystals by Laue and Powder techniques (L2).</p>

Engineering Geology	CO1	Identify and classify the geological minerals
	CO2	Measure the rock strengths of various rocks
		CO3
	CO4	Classify, monitor and measure the Landslides and subsidence
	CO5	Prepares, analyses and interpret the Engineering Geologic maps
Engineering Geology(LAB)	CO1	Identify Megascopic minerals & their properties.
	CO2	Identify Megascopic rocks & their properties.
BASICS OF CIVIL ENGG. (WORK SHOP) LAB (ESC1103)	CO1	identify various components of a building and give lump-sum estimate. ∅ Determine distances and irregular areas using conventional survey instruments like chain, tape, cross-staff and compass ∅ Identify different soils ∅ Know various traffic signs & signals ∅ Determine center of gravity and moment of inertia of channel and I-sections. ∅ Set out a signal room building as per given plan ∅ Install simple sanitary filling and find discharge/velocity in a water pipe line as density of water ∅ Know to the process of making cement mortar / concrete for nominal mix
	CO2	Determine distances and irregular areas using conventional survey instruments like chain, tape, cross-staff and compass
	CO3	Identify different soils ∅ Know various traffic signs & signals
	CO4	Determine center of gravity and moment of inertia of channel and I-section
	CO5	Set out a signal room building as per given plan ∅ Install simple sanitary filling and find discharge/velocity in a water pipe line as density of water
CO6	Know to the process of making cement mortar / concrete for nominal mix.	

B.Tech2 nd Sem		
Course Name	Course Outcomes	
Mathematics– II (Linear	CO1	develop the use of matrix algebra techniques that is

Algebra & Numerical Methods)		needed by engineers for practical applications (L6)
	CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
	CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms (L5)
	CO4	<ul style="list-style-type: none"> • apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
	CO5	apply numerical integral techniques to different Engineering problems (L3)
	CO6	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3)
Engineering Chemistry	CO1	<p>At the end of this unit, the students will be able to • Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.</p>
Programing for problem solving using c.	CO1	To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
	CO2	To gain knowledge of the operators, selection, control statements and repetition in C
	CO3	To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage.
	CO4	To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor
	CO5	To assimilate about File I/O and significance of functions
Building Materials and Concrete Technology	CO1	. Know various engineering properties of building construction materials and suggest their suitability
	CO2	Identify the functional role of ingredients of concrete and apply this knowledge to concrete mix design.
	CO3	

		Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete
Building Planning And Aided Building Drawing	CO1	Perform basic commands of any suitable CAD software to draw 2D drawings
	CO2	Interpret the conventions, signs and symbols from a given drawing.
	CO3	Prepare line plans of residential and public buildings using principles of planning.
	CO4	Prepare submission and working drawing from the given requirement for Load Bearing and Framed structures

CHEMISTRY LAB (BSC1203)	CO1	practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills
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B.Tech3rdSem

Course Name	Course Outcomes	
Mathematics -III (Vector Calculus, Transforms and PDE)	CO1	interpret the physical meaning of different operators such as gradient, curl and divergence(L50
	CO2	estimate the work done against a field, circulation and flux using vector calculus (L5)
	CO3	apply the Laplace transform for solving differential equations (L3)
	CO4	find or compute the Fourier series of periodic signals (L3)
	CO5	know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
	CO6	identify solution methods for partial differential equations that model physical processes (L3)
Strength of Materials - I	CO1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions .
	CO2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
	CO3	The student will have knowledge of bending concepts

		and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions .
	CO4	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lamé's equation.
Fluid Mechanics	CO1	<ul style="list-style-type: none"> Understand the various properties of fluids and their influence on fluid motion and analyses a variety of problems in fluid statics and dynamics.
	CO2	variety of problems in fluid statics and dynamics.
	CO3	Calculate the forces that act on submerged planes and curves.
	Co4	Ability to analyses various types of fluid flows.
	CO5	<ul style="list-style-type: none"> Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
	CO6	Able Measure the quantities of fluid flowing in pipes, tanks and channels.
Surveying And Geometrics.	CO1	Apply the knowledge to calculate angles, distances and levels
	CO2	Identify data collection methods and prepare field notes
	CO3	Understand the working principles of survey instruments, measurement errors and corrective measures.
	CO4	Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies.
HIGHWAY ENGINEERING	CO1	Plan highway network for a given area.
	CO2	Determine Highway alignment and design highway geometrics
	CO3	Design Intersections and prepare traffic management plans
	CO4	Judge suitability of pavement materials and design flexible and rigid pavements

CONCRETE TECHNOLOGY LAB	CO1	n successful completion of this course, student will be able to <ul style="list-style-type: none"> Determine consistency and fineness of cement.
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	CO2	Determine consistency and fineness of cement
	CO3	Determine setting times of cement
	CO4	Determine specific gravity and soundness of cement.
	CO5	Determine compressive strength of cement
	CO6	Determine workability of cement concrete by compaction factor, slump and Vee – Bee test
	CO7	Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis
	CO8	Determine flakiness and elongation index of aggregates.
	CO9	Determine bulking of sand.
	C10	Understand non-destructive testing procedures on concrete.
HIGHWAY ENGINEERING LAB	CO1	. Test aggregates and judge the suitability of materials for the road construction
	CO2	Test the given bitumen samples and judge their suitability for the road construction
	CO3	Obtain the optimum bitumen content for Bituminous Concrete.
	CO4	Determine the traffic volume, speed and parking characteristics.
CONSTITUTION OF INDIA (MC)	CO1	Understand the concept of Indian constitution .
	CO2	Apply the knowledge on directive principle of state policy
	CO3	Analyze the History, features of Indian constitution
	CO4	Evaluate Preamble Fundamental Rights and Duties.
B.Tech4 th Sem		
Course Name	Course Outcomes	
	CO4	apply discrete and continuous probability distributions (L3)
	CO5	design the components of a classical hypothesis test (L6)

	CO6	infer the statistical inferential methods based on small and large sampling tests (L4)
Strength of Materials - II	CO1	The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
	CO2	The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
Hydraulics and Hydraulic Machinery	CO1	Solve uniform and non-uniform open channel flow problems.
	CO2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
	CO3	Understand the working principles of various hydraulic machineries and pumps.
Environmental Engineering	CO1	Select a source based on quality and quantity and Estimate design population and water demand
	CO2	Design a water treatment plant for a village/city
	CO3	Design a sewer by estimating DWF and Strom water flow and plumbing system for buildings
	CO4	Design a Sewage Treatment Plant for a town/city
Managerial Economics & Financial Analysis	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.
	CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
	CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
	CO4	The Learner is able to prepare Financial Statements and the usage of various accounting tools for Analysis.
	CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
	CO4	Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies.
Environmental Engineering	CO1	Estimate some important characteristics of water, wastewater and soil in the laboratory .
	CO2	Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry
	CO3	Estimate Chloride, EC and Salinity of Soil and suggest their

		suitability for Construction/Agriculture
	CO4	Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
	CO5	Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture

B.Tech5thSem

Course Name	Course Outcomes	
Professional Core courses (STRUCTURAL ANALYSIS)	CO1	Distinguish between the determinate and indeterminate structures.
	CO2	Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.
	CO3	Estimate the bending moment and shear forces in beams for different fixity conditions.
	CO4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems
	CO5	Draw the influence line diagrams for various types of Shoving loads on beams/bridges.
	CO6	Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.
Professional Core courses (DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES)	CO1	Work on different types of design methods
	CO2	Carryout analysis and design of flexural members and detailing
	CO3	Design structures subjected to shear, bond and torsion
	CO4	Design different type of compression members and footings
Professional Core courses (GEOTECHNICAL ENGINEERING-1)	CO1	The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships
	CO2	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils
	CO3	. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
	CO4	The student should be able to apply the above

		concepts in day-to-day civil engineering practice.
GeotechnicalEngineering(Lab)	CO1	Determine index properties of soil and classify them. b. Determine permeability of soils. c. Determine Compaction, Consolidation and shear strength characteristics.
	CO2	Determine permeability of soils
	CO3	Determine Compaction, Consolidation and shear strength characteristics
Construction Technology &Management.	CO1	appreciate the importance of construction planning 2. understand the functioning of various earth moving equipment 3. know the methods of production of aggregate products and concreting 4. apply the gained knowledge to project management and construction techniques
	CO2	understand the functioning of various earth moving equipment.
	CO3	. know the methods of production of aggregate products and concreting.
	CO4	apply the gained knowledge to project management and construction techniques.
	CO1	Be familiar with ground, air and satellite-based sensor platforms.
	CO2	Interpret the aerial photographs and satellite imageries
	CO3	Create and input spatial data for GIS application.
	CO4	. Apply RS and GIS concepts for application in Civil Engineering
	Construction Technology &Management.	CO1
CO2		Selection of an appropriate EIA me
Remote sensing and Giss	CO3	Evaluation of impacts on environment
	CO4	Evaluation of risk assessment.

B.Tech6 th Sem		
Course Name	Course Outcomes	
Design And Drawing Of Steel Structure.	CO1	• Work with relevant Is codes.
	CO2	Carryout analysis and design of flexural members and detailing
	CO3	Design compression members of different types with connection detailing
	CO4	Design Plate Girder and Gantry Girder with connection detailing

	CO5	Produce the drawings pertaining to different components of steel structures.
Water Resources Engineering	CO1	Have a thorough understanding of the theories and principles governing the hydrologic processes.
	CO2	Be able to quantify hydrologic components and apply concepts in hydrologic design of water resources projects.
	CO3	Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures
	CO4	Develop design storms and carry out frequency analysis.
	CO5	Develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects
	CO6	Develop unit hydrograph and synthetic hydrograph.
Geotechnical Engineering-II	CO1	The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
	CO2	The student must be able to compute the magnitude of foundation settlement and decide on the size of the foundation accordingly
	CO3	. The student must be able to use the field test data and arrive at the bearing capacity.
	CO4	The student must be able to apply the principles of bearing capacity of piles and design them accordingly.
Estimation Costing Construct (Lab)	CO1	The student should be able to determine the quantities of different components of buildings.
	CO2	The student should be in a position to find the cost of various building components.
	CO3	The student should be capable of finalizing the value of structures.
	CO4	Understand design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters
	CO5	Apply non linear kinetics.
PC-Lab-Remote Sensing & Giss LAB	CO1	Work comfortably on GIS software.
	CO2	Digitize and create thematic map and extract important features
	CO3	Develop digital elevation model
	CO4	Interpretation and Estimation of features from satellite imagery
	CO5	Analyze and Modelling using GIS software.

PC-Lab -Civil Engineering Practice LAB	CO1	Gains adequate confidence to work as a consulting engineer in any field of Civil .
	CO2	Understands the duties, responsibilities and coal practices of Civil Engineering profession
	CO3	Will be ready to plan, design and execute Civil Engineering projects
	CO4	Can build safety related and environmental impact related
	CO5	Can optimize project costs using sustainability concepts
SC-Lab-Cad LAB	CO1	Model the geometry of real-world structure Represent the physical model of structural element/structure .
	CO2	Perform analysis
	CO3	Interpret from the Post processing results
	CO4	Design the structural elements and a system as per IS Codes
MC-Employability Skills	CO1	To solve aptitude and reasoning problems.
	CO2	Apply the soft skills in dealing the issues related to Employability
	CO3	Successful in getting employment in campus placement interview.
B.Tech 7th Sem		
PE-601-II a) ADVANCED STRUCTURAL ANALYSIS	CO1	• Differentiate Determinate and Indeterminate Structures
	CO2	Carryout lateral Load analysis of structure
	CO3	Analyze Cable and Suspension Bridge structures
	CO4	Analyze structures using Moment Distribution, Kani's Method and Matrix methods
PE-601- II b). Architecture And Town Planning	CO1	Distinguish architectural styles of eastern and western world.
	CO2	Understand the importance of Orders of architecture
	CO3	. Compose spaces of buildings using design concepts, planning principles
	CO4	Understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities.
PE-601- II c). Road Safety Engineering	CO1	To understand fundamental of Traffic Engineering .
	CO2	To investigate & determine the collective factors & remedies of accident involved
	CO3	To design & planning various road geometrics

	CO4	To massage the traffic system from road safety point of view
PE-601- II (d) – Traffic Engineering	CO1	Determine traffic speed, volume, travel time and density
	CO2	Design traffic signals
	CO3	Determine highway capacity and LOS
HSC701-INTELLECTUAL PROPERTY RIGHTS AND PATENTSs	CO1	understood the significance of innovations, distinguish different kinds of IPRs and know the legislative framework, practice and procedure relating to Patents, Copyrights, Trademarks, Designs, Trade Secrets, Geographical Indications, Traditional Knowledge and certain emerging areas.
	CO2	understood the various components of copyright law, its protection and enforcement to know the application of copyright law, its duration, advantages and the issues of ‘fair use’ and ‘plagiarism’ in the digital era.
	CO3	Understood the Patent law in India and its global instruments and spell out the procedural requirements of novelty, non-obviousness and inventive step involved in obtaining a Patent, its exclusive rights besides assignment and licensing patterns and how the patent does benefit the society.
	CO4	understood the conceptual and legal framework, procedural requirements relating to Trade Marks and its infringement and gives an insight how the Trademark is commercially advantageous to its owner and to prevent unfair competition and further safeguarding the trade secrets of the business enterprises.
	CO5	Understood the importance of E-commerce, data security, online transactions and how the confidentiality and privacy can be safeguarded through the digital signatures and the prevention and punishment of cybercrimes under the law.
SC-701- Project Planning, Town Planning.	CO1	Design raft foundations and different types of RCC retaining walls.
	CO2	Carryout analysis and design of different types of RCC water tanks.
	CO3	Solve the problems regarding design of RCC Bunkers, Silos and Chimneys.
	CO4	Understand the concepts of prefabricated construction.
PE-701- III b) BRIDGE ENGINEERING	CO1	Explain different types of Bridges with diagrams and Loading standards.
	CO2	Carryout analysis and design of Slab bridges, T

		Beam bridges, Box culvers and suggest structural detailing
	CO3	Carryout analysis and design of Plate girder bridges
	CO4	Organize for attending inspections and maintenance of bridges and prepare reports
PE-701- III c) STRUCTURAL DYNAMICS	CO1	CO1 Understand the response of structural systems to dynamic loads loads Harmonic
	CO2	Realize the behavior and response of linear and nonlinear SDOF and MDOF structures with various dynamic loading
	CO3	CO3 Understand the behavior and response of MDOF structures with various dynamic Loading.
	CO4	CO4 Possess the ability to find out suitable solution for continuous system.
	CO5	Understand the behavior of structures subjected to dynamic loads under free vibration.
PE-701- III d) URBAN TRANSPORTATION PLANNING	CO1	. Estimate travel demand for an urban area .
	CO2	Plan the transportation network for a city
	CO3	Identify the corridor and plan for providing good transportation facilities
	CO4	Evaluate various alternative transportation proposals
PE-702- IV a). GROUND IMPROVEMENT TECHNIQUES	CO1	By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations. of grouting.
	CO2	The student should be in a position to design a reinforced earth embankment and check its stability
	CO3	. The student should know the various functions of Geo synthetics and their applications in Civil Engineering practice
	CO4	The student should be able to understand the concepts and applications of grouting
PE-702- IV (b) GEO- SPATIAL TECHNOLOGIES	CO1	Understand the geospatial technology relating to the data acquiring and processing that is associated with geographic locations .
	CO2	Apply Geospatial techniques in the decision support systems useful for decision makers and community services
	CO3	Ability to solve the problems related to the natural resource management, environment, urban planning and Infrastructure development, etc..

	CO4	Able to generate the thematic maps using Geospatial techniques e) Apply the concept of Geospatial Techniques to the Civil Engineering problems
PE-702- IV d). SOIL DYNAMICS AND MACHINE FOUNDATIONS	CO1	Use theory of vibrations to find the behavior of soil under dynamic loading.
	CO2	Design machine foundations under different loads and soil conditions
	CO3	. Understand the liquefaction phenomena.
	CO4	. Conduct various laboratory and filed tests to determine the dynamic soil prosperities and its interpretation
	CO5	Design vibration isolators under any vibratory machines.
	CO3	Canal drop-Notch type.
	CO4	Canal regulator.
PE-703- V b). EARTH & ROCKFILL DAMS	CO1	Able to design earth and rock fill dams .
	CO2	Get familiarity with slope stability calculations.
	CO3	Prevention techniques for slope failures.
PE-703- V c). URBAN HYDROLOGY	CO1	develop intensity duration frequency curves for urban drainage systems.
	CO2	Develop design storms to size the various components of drainage systems
	CO3	Apply best management practices to manage urban flooding
	CO4	Prepare master drainage plan for an urbanized area
	B.Tech 8th Sem	
STRENGTH OF MATE(RIALS	CO1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions..
		The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
		The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions.
		The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal

		pressure using Lamé's equation
FLUID MECHANICS	Course Name	Course Outcomes
	CO1	1. Understand the various properties of fluids and their influence on fluid motion and analyze a variety of problems in fluid statics and dynamics. 2. Calculate the forces that act on submerged planes and curves. 3. Analyze various types of flow problems through closed conduits. 4. Measure the quantities of fluid flowing in pipes and channels. 5. Understand the concepts of Boundary layer and solve problems on boundary layer.
	CO2	Calculate the forces that act on submerged planes and curves.
	CO3	Analyze various types of flow problems through closed conduits.
	CO4	. Measure the quantities of fluid flowing in pipes and channels.
	CO5	Understand the concepts of Boundary layer and solve problems on boundary layer.
SURVEYING & GEOMATICS	CO1	1. Describe the function of surveying and work with survey instruments, take observations, and prepare plan, profile, and cross-section and perform calculations.
	CO2	Calculate, design and layout horizontal and vertical curves.
	CO3	Operate a total station and GPS to measure distance, angles, and to calculate differences in Elevation. Reduce data for application in a geographic information system.
	CO4	Relate and apply principles of photogrammetry for surveying.
	CO5	Apply principles of Remote Sensing and Digital Image Processing for Civil Engineering problems.
HIGHWAY ENGINEERING	CO1	Plan highway network for a given area.
	CO2	Plan highway network for a given area. Determine Highway alignment and design highway geometrics..
	CO3	Design Intersections and prepare traffic management plans.
	CO4	Judge suitability of pavement materials and design flexible and rigid pavement.

. ROAD SAFETY ENGINEERING	CO1	a) To understand fundamental of Traffic Engineering.
	CO2	To investigate & determine the collective factors & remedies of accident involved.
	CO3	To massage the traffic system from road safety point of view.
ENVIRONMENTAL MANAGEMENT	CO1	. a. Plan and design the water and wastewater systems
	CO2	Identify the source of emissions and select proper control systems.
	CO3	Design & estimation of water supply system for a city.
	CO4	to get knowledge about various environmental aspects.
	CO5	Selection of suitable treatment flow for raw water treatments.
URBAN PLANNING	CO1	. A Estimate travel demand for an urban area .
	CO2	Plan the transportation network for a city.
	CO3	Identify the corridor and plan for providing good transportation facilities.
	CO4	D Evaluate various alternative transportation proposals.
	CO5	
ELEMENTS OF CIVIL ENGINEERING	CO1	a) basics of Civil Engineering concepts .
	CO2	the surveying the elevations and mapping.
	CO3	the construction materials and elements.
	CO4	water resource development and.
	CO5	overall infrastructure development.
ENVIRONMENTAL ENGINEERING	CO1	. A Plan and design the water and distribution networks and sewerage systems .
	CO2	Identify the water source and select proper intake structure.
	CO3	Design & estimation of water supply system of an apartment.
	CO4	. Select the appropriate appurtenances in the water supply.
	CO5	Selection of suitable treatment flow for raw water treatments.
DISASTER MANAGEMENT	CO1	a. Affirm the usefulness of integrating management principles in disaster mitigation .
	CO2	Distinguish between the different approaches

		needed to manage pre- during and post- disaster periods.
	CO3	Explain the process of risk management.
	CO4	Relate to risk transfer.
	CO5	
WATER RESOURCES ENGINEERING	CO1	. A Have a thorough understanding of the theories and principles governing the hydrologic processes.
	CO2	. Be able to quantify hydrologic components and apply concepts in hydrologic design of water resources projects.
	CO3	. Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
	CO4	D Develop design storms and carry out frequency analysis.
	CO5	Develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects.
	CO6	Develop unit hydrograph and synthetic hydrograph.
HYDRAULICS AND HYDRAULIC MACHINERY	CO1	→ Solve uniform and non-uniform open channel flow problems.
	CO2	→ Apply the principals of dimensional analysis and similitude in hydraulic model testing.
	CO3	. Select suitable pumps and turbines.
GREEN TECHNOLOGY	CO1	→ Enlist different concepts of green technologies in a project .
	CO2	Understand the principles of Energy efficient technologies.
	CO3	→ Estimate the carbon credits of various activities.
	CO4	Identify the importance of life cycle assessment.
	CO5	Recognize the benefits of green fuels with respect to sustainable development.
REMOTE SENSING & GIS	CO1	At the end of the course the student will be able to .
	CO2	interpret the aerial photographs and satellite imageries.
	CO3	create and input spatial data for GIS application.
	CO4	. apply RS and GIS concepts for application in Civil Engineering.

FINITE ELEMENT METHOD(HONOR COURSE)	CO1	Develop finite element formulations of 1 degree of freedom problems and solve them
	CO2	Understand any Finite Elements of twareto per form stress, thermal and modal analysis
	CO3	Compute the stiffness matrices of different elements and system
	CO4	Interpret displacements, strains and stress resultants
	CO5	Analyze planar structural systems using finite element modeling Mapping of Course
EARTHQUAKE RESISTANT DESIGN	CO1	CO1 To learn the fundamentals of seismology and basic earthquake mechanisms, Tectonics types of ground motion, and propagation of ground motion.
	CO2	Understand qualitative and quantitative representations of earthquake magnitude.
	CO3	Determinethenatural frequencyofasingledegreeoff reedomdynamicssystem For given mass, stiffness and damping properties.
	CO4	Determinethemaximumdynamicresponseofanelasticvibratingstructuretoa given forcing function .
	CO5	Learn the fundamentals of building code based structural design.
PRE-STRESSED CONCRETE	CO1	• Understand different methods of pre stressing
	CO2	. Estimate effective pre stress including short and long-term losses.
	CO3	Analyze and design pre stressed concrete beams under flexure and shear.
	CO4	. Understand the relevant IS Code provisions for pre stressed concrete.
REPAIR AND REHABILITATION OF STRUCTURES	CO1	CO1 Recognize the mechanisms of degradation of concrete structures and to design durable Concrete structures. DEPARTMENT OF CIVIL ENGINEERING CO2 Conduct field monitoring and .
	CO2	Conduct field monitoring and non destructive evaluation of concrete structures. Design and suggest repair strategies for deteriorated concrete structures including Repairing with composites.
	CO3	Understand the methods of strengthening methods for concrete structures.
	CO4	Assessment of the service ability and residual life span of concrete structures by Visual inspection and in situ tests.

REINFORCED SOIL STRUCTURES	CO1	Understand the history and mechanism of reinforced soil.
	CO2	Become aware about situations where geo-synthetics can be used.
	CO3	Know about various types of geo-synthetics and their functions.
	CO4	Be able to do simple design of reinforced soil retaining walls and reinforced earth beds.
ADVANCED FOUNDATION ENGINEERING	CO1	CO1 Understand classification of piles and determine the load carrying capacity of piles by various methods
	CO2	Determine the load carrying capacity of pile groups.
	CO3	Evaluate the pull-out capacity of piles and down drag forces on piles due to negative skin friction.
	CO4	Determine the load carrying capacity of laterally loaded piles.
	CO5	Determine the load carrying capacity of piers and caissons.
EARTH RETAINING STRUCTURES	CO1	CO1 Quantify the lateral earth pressures associated with different earth systems.
	CO2	CO2 Evaluate the mechanical properties of geo synthetics used for soil reinforcement.
	CO3	. Identify the merits and demerits of different earth retaining systems.
	CO4	CO4 Select the most technically appropriate type of retaining wall for the application from a thorough knowledge of available systems.
	CO5	Design of retaining structures using appropriate design methods, factors of safety, earth pressure diagrams and field verification methods.
GEOENVIRONMENTAL ENGINEERING	CO1	Understand various ground contaminations, pollution transport phenomena.
	CO2	. Collect pollutant data Apply principles to get the information about the transport through the unsaturated soil.
	CO3	Develop various models for contamination transport.
EARTH AND ROCKFILL DAMS	CO1	O1 Understand the basic concepts of earth-fill dams and rock-fill dams and identify the site topography and foundations conditions
	CO2	conditions Identify basic design requirements and causes of failures of dams, distinguish foundation types and the different fill materials.

	CO3	conditions Identify basic design requirements and causes of failures of dams, distinguish foundation types and the different fill materials.
	CO4	. Estimate seepage through dam sections, foundations and select core and shell materials.
	CO5	Understand and design the methods to control seepage through different units of dams .
a) URBAN HYDROLOGY	CO1	Basic concepts of Urban Hydrological cycle and effect of urbanization on .
	CO2	1. Slightly 2. Moderately 3. Detailed.
	CO3	Knowledge about the methods of quantity estimation of storm water.
	CO4	Analyze the Infrastructure for storm water management.
	CO5	Explain about the Study the process of urbanization and its influence on urban hydrological processes and urban water supply system including, storm water modeling. Mapping of Course Outcomes.

DEPARTMENT OF CSE (AIML) Courses Outcomes(R20)

CSE (AIML) Courses Outcomes(R20)

B. tech 1st Semester		
Course Name	Course Outcomes	
COMMUNICATIVE ENGLISH (HS1101)	CO1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
	CO2	ask and answer general questions on familiar topics and introduce oneself/others
	CO3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
	CO4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
	CO5	form sentences using proper grammatical structures and correct word forms
MATHEMATICS-I (BS1101)	CO1	utilize mean value theorems to real life problems
	CO2	solve the differential equations related to various engineering fields
	CO3	familiarize with functions of several variables which is useful in optimization
	CO4	apply double integration techniques in evaluating areas bounded by region
	CO5	students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems
APPLIED CHEMISTRY (BS1102)	CO1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.
	CO2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
	CO3	Synthesize nano materials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
	CO4	Analyze the principles of different analytical instruments and their applications. Design models for energy by different natural

		sources.
	CO5	Obtain the knowledge of computational chemistry and molecular machines
:PROGRAMMING FOR PROBLEM SOLVING USING C (ES1101)	CO1	To write algorithms and to draw flowcharts for solving problems
	CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
	CO3	To use different operators, data types and write programs that use two-way/ multi-way selection
	CO4	To select the best loop construct for a given problem
	CO5	To design and implement programs to analyze the different pointer applications
	CO6	To decompose a problem into functions and to develop modular reusable code
	CO7	To apply File I/O operations
COMPUTER ENGINEERING WORKSHOP (ES1102)	CO1	Assemble and disassemble components of a PC
	CO2	Construct a fully functional virtual machine, Summarize various Linux operating system commands,
	CO3	Recognize characters & extract text from scanned images, Create audio files and podcasts
APPLIED CHEMISTRY LAB (BS1103)	CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
PROGRAMMING FOR PROBLEM SOLVING USING C LAB (ES1103)	CO1	Gains Knowledge on various concepts of a C language.
	CO2	Able to draw flowcharts and write algorithms.
	CO3	Able design and development of C problem solving skills.
	CO4	Able to design and develop modular programming skills.
	CO5	Able to trace and debug a program

B.Tech 2nd Semester		
Course Name	Course Outcomes	
MATHEMATICS - II (BS1201)	CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications
	CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel
	CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms
	CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals
	CO5	apply numerical integral techniques to different Engineering problems
	CO6	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations
APPLIED PHYSICS (BS1202)	CO1	Explain the need of coherent sources and the conditions for sustained interference (L2). Identify the applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2). Classify ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)
	CO2	Explain various types of emission of radiation (L2). Identify the role of laser in engineering applications (L3). Describe the construction and working principles of various types of lasers (L1). Explain the working principle of optical fibers (L2). Classify optical fibers based on refractive index profile and mode of propagation (L2). Identify the applications of optical fibers in medical, communication and other fields (L2). Apply the fiber optic concepts in various fields (L3).
	CO3	Describe the dual nature of matter (L1). Explain the significance of wave function (L2). Identify the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). Identify the role of classical and quantum free electron theory in the study of electrical conductivity (L3). Classify the energy bands of solids (L2).
	CO4	Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Claussius-Mosotti relation in dielectrics (L2). Classify the magnetic

		materials based on susceptibility and their temperature dependence (L2). Explain the applications of dielectric and magnetic materials (L2). Apply the concept of magnetism to magnetic devices
	CO5	Outline the properties of charge carriers in semiconductors (L2). Identify the type of semiconductor using Hall effect (L2). Identify applications of semiconductors in electronic devices (L2). Classify superconductors based on Meissner's effect (L2). Explain Meissner's effect, BCS theory & Josephson effect in superconductors (L2).
DIGITAL LOGIC DESIGN (ES1201)	CO1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
	CO2	An ability to understand the different switching algebra theorems and apply them for logic functions.
	CO3	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
	CO4	Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
	CO5	Students will be able to design various sequential circuits starting from flip-flop to registers and counter
PYTHON PROGRAMMING (ES1202)	CO1	Develop essential programming skills in computer programming concepts like data types, containers
	CO2	Apply the basics of programming in the Python language
	CO3	Solve coding tasks related conditional execution, loops
	CO4	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming
DATA STRUCTURES (CS1201)	CO1	Summarize the properties, interfaces, and behaviors of basic abstract data types
	CO2	Discuss the computational efficiency of the principal algorithms for sorting & searching
	CO3	Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs
	CO4	Demonstrate different methods for traversing trees
PYTHON	CO1	Write, Test and Debug Python Programs

PROGRAMMING LAB (ES1203)	CO2	Use Conditionals and Loops for Python Programs
	CO3	Use functions and represent Compound data using Lists, Tuples and Dictionaries
	CO4	Use various applications using python
DATA STRUCTURES LAB (CS1202)	CO1	Use basic data structures such as arrays and linked list.
	CO2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
	CO3	Use various searching and sorting algorithms.
CONSTITUTION OF INDIA (MC1201)	CO1	Understand historical background of the constitution making and its importance for building a democratic India.
	CO2	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary
	CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India
	CO4	Analyze the decentralization of power between central, state and local self-government.
	CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Pachayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission

B. Tech 3rd Semester		
Course Name	Course Outcomes	
MATHEMATICS - III	CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence
	CO2	Estimate the work done against a field, circulation and flux using vector calculus
	CO3	Apply the Laplace transform for solving differential equations
	CO4	Find or compute the Fourier series of periodic signals

	CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
	CO6	Identify solution methods for partial differential equations that model physical processes
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1	Demonstrate skills in solving mathematical problems
	CO2	Comprehend mathematical principles and logic
	CO3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
	CO4	Manipulate and analyze data numerically and/or graphically using appropriate Software
	CO5	Communicate effectively mathematical ideas/results verbally or in writing
INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	CO1	Enumerate the history and foundations of Artificial Intelligence
	CO2	Apply the basic principles of AI in problem solving
	CO3	Choose the appropriate representation of Knowledge
	CO4	Enumerate the Perspectives and Issues in Machine Learning
	CO5	Identify issues in Decision Tree Learning
OBJECT ORIENTED PROGRAMMING WITH JAVA	CO1	Able to realize the concept of Object Oriented Programming & Java Programming Constructs
	CO2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords
	CO3	Apply the concept of exception handling and Input/Output operations
	CO4	Able to design the applications of Java & Java applet
	CO5	Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit
DATABASE MANAGEMENT SYSTEMS	CO1	Describe a relational database and object-oriented database
	CO2	Create, maintain and manipulate a relational database using SQL
	CO3	Describe ER model and normalization for database design
	CO4	Examine issues in data storage and query processing and can formulate appropriate solutions

	CO5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage
INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB	CO1	Apply the basic principles of AI in problem solving using LISP/PROLOG
	CO2	Implement different algorithms using LISP/PROLOG
	CO3	Develop an Expert System using JESS/PROLOG
OBJECT ORIENTED PROGRAMMING WITH JAVA LAB	CO1	Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings
	CO2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
	CO3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
	CO4	Construct Threads, Event Handling, implement packages, developing applets
DATABASE MANAGEMENT SYSTEMS LAB	CO1	Utilize SQL to execute queries for creating database and performing data manipulation operations
	CO2	Examine integrity constraints to build efficient databases
	CO3	Apply Queries using Advanced Concepts of SQL
	CO4	Build PL/SQL programs including stored procedures, functions, cursors and triggers
MOBILE APP DEVELOPMENT	CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms
	CO2	Critique mobile applications on their design pros and cons
	CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
	CO4	Program mobile applications for the Android operating system that use basic and advanced phone features and
	CO5	Deploy applications to the Android marketplace for distribution
ESSENCE OF INDIAN TRADITIONAL	CO1	Understand the significance of Indian Traditional Knowledge

KNOWLEDGE	CO2	Classify the Indian Traditional Knowledge
	CO3	Compare Modern Science with Indian Traditional Knowledge system.
	CO4	Analyze the role of Government in protecting the Traditional Knowledge
	CO5	Understand the impact of Philosophical tradition on Indian Knowledge System.

B.Tech 4th Semester		
Course Name	Course Outcomes	
PROBABILITY AND STATISTICS	CO1	Classify the concepts of data science and its importance
	CO2	Interpret the association of characteristics and through correlation and regression tools
	CO3	Make use of the concepts of probability and their applications
	CO4	Apply discrete and continuous probability distributions
	CO5	Design the components of a classical hypothesis test
	CO6	Infer the statistical inferential methods based on small and large sampling tests
COMPUTER ORGANIZATION	CO1	Develop a detailed understanding of computer systems
	CO2	Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations
	CO3	Develop a detailed understanding of architecture and functionality of central processing unit
	CO4	Exemplify in a better way the I/O and memory organization
	CO5	Illustrate concepts of parallel processing, pipelining and inter processor communication
DATA WAREHOUSING AND MINING	CO1	Summarize the architecture of data warehouse
	CO2	Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data
	CO3	Construct a decision tree and resolve the problem of model over fitting
	CO4	Compare Apriori and FP-growth association rule

		mining algorithms for frequent item set generation
	CO5	Apply suitable clustering algorithm for the given data set
FORMAL LANGUAGES AND AUTOMATA THEORY	CO1	Classify machines by their power to recognize languages
	CO2	Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
	CO3	Employ finite state machines to solve problems in computing
	CO4	Illustrate deterministic and non-deterministic machines
	CO5	Quote the hierarchy of problems arising in the computer science
MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
	CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
	CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
	CO4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
	CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
R PROGRAMMING LAB	CO1	Implement basic concepts of R programming, and its different module that includes conditional, looping, lists, Strings, Functions, Frames, Arrays, and File programming.
	CO2	Implement the concepts of R Script to extract the data from data frames and file operations.
	CO3	Implement the various statistical techniques using R.
	CO4	Extend the functionality of R by using add-on packages
	CO5	Use R Graphics and Tables to visualize results of various statistical operations on data
DATA MINING USING	CO1	Apply preprocessing techniques on real world datasets

PYTHON LAB	CO2	Apply apriori algorithm to generate frequent item sets.
	CO3	Apply Classification and clustering algorithms on different datasets.
WEB APPLICATION DEVELOPMENT LAB	CO1	Develop Single Page Applications
	CO2	Develop NodeJS & ReactJS Reusable Service
	CO3	Store the data in MySQL
	CO4	Get acquainted with the latest web application development trends in the IT industry
NATURAL LANGUAGE PROCESSING WITH PYTHON	CO1	Explore natural language processing (NLP) libraries in Python
	CO2	Learn various techniques for implementing NLP including parsing & text processing
	CO3	Understand how to use NLP for text feature engineering

B.Tech 5th Semester		
Course Name	Course Outcomes	
COMPILER DESIGN	CO1	Demonstrate phases in the design of compiler
	CO2	Organize Syntax Analysis, Top Down and LL(1) grammars
	CO3	Design Bottom Up Parsing and Construction of LR parsers
	CO4	Analyze synthesized, inherited attributes and syntax directed translation schemes
	CO5	Determine algorithms to generate code for a target machine
OPERATING SYSTEMS	CO1	Describe various generations of Operating System and functions of Operating System
	CO2	Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance
	CO3	Solve Inter Process Communication problems using Mathematical Equations by various methods
	CO4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques
	CO5	Outline File Systems in Operating System like UNIX/Linux and Windows

MACHINE LEARNING	CO1	Explain the fundamental usage of the concept Machine Learning system
	CO2	Demonstrate on various regression Technique
	CO3	Analyze the Ensemble Learning Methods
	CO4	Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
	CO5	Discuss the Neural Network Models and Fundamentals concepts of Deep Learning
OPTIMIZATION IN OPERATIONS RESEARCH	CO1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
	CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
	CO3	Apply and Solve transportation and assignment problem by using Linear programming Simplex method.
	CO4	Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions
	CO5	Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.
SOFTWARE ENGINEERING(Professional Elective-I)	CO1	Ability to transform an Object-Oriented Design into high quality, executable code
	CO2	Skills to design, implement, and execute test cases at the Unit and Integration level
	CO3	Compare conventional and agile software methods
COMPUTER VISION (Professional Elective-I)	CO1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
	CO2	Describe known principles of feature detection and matching,
	CO3	Describe basic methods of computer vision related to image stitching, photography like high dynamic range imaging and blur removal.
	CO4	Suggest a design of a computer vision system for a 3D Reconstruction, Albedos, image based rendering views and depths.

DATA VISUALIZATION (Professional Elective-I)	CO1	Understand basics of Data Visualization
	CO2	Implement visualization of distributions
	CO3	Write programs on visualization of time series, proportions & associations
	CO4	Apply visualization on Trends and uncertainty
	CO5	Explain principles of proportions
DevOps (Professional Elective-I)	CO1	Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
	CO2	Describe DevOps & DevSecOps methodologies and their key concepts
	CO3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
	CO4	Set up complete private infrastructure using version control systems and CI/CD tools
	CO5	Acquire the knowledge of maturity model, Maturity Assessment
OPERATING SYSTEMS & COMPILER DESIGN LAB	CO1	Implement various scheduling, page replacement algorithms and algorithms related to deadlocks
	CO2	Design programs for shared memory management and semaphores
	CO3	Determine predictive parsing table for a CFG
	CO4	Apply Lex and Yacc tools
	CO5	Examine LR parser and generating SLR Parsing table
MACHINE LEARNING LAB	CO1	Implement procedures for the machine learning algorithms
	CO2	Design and Develop Python programs for various Learning algorithms
	CO3	Apply appropriate data sets to the Machine Learning algorithms
	CO4	Develop Machine Learning algorithms to solve real world problems
CONTINUOUS INTEGRATION AND CONTINUOUS DELIVERY	CO1	Understand the why, what and how of DevOps adoption
	CO2	Attain literacy on Devops

USING DevOps (Skill Oriented Course III)	CO3	Align capabilities required in the team
	CO4	Create an automated CICD pipeline using a stack of tools
EMPLOYABILITY SKILLS-I	CO1	Understand the corporate etiquette.
	CO2	Make presentations effectively with appropriate body language
	CO3	Be composed with positive attitude
	CO4	Understand the core competencies to succeed in professional and personal life
MACHINE LEARNING(MINOR COURSE)	CO1	Implement procedures for the machine learning algorithms
	CO2	Design and Develop Python programs for various Learning algorithms
	CO3	Apply appropriate data sets to the Machine Learning algorithms
	CO4	Develop Machine Learning algorithms to solve real world problems

B.Tech 6th Semester		
Course Name	Course Outcomes	
COMPUTER NETWORKS	CO1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
	CO2	Discuss different transmission media and different switching networks.
	CO3	Analyze data link layer services, functions and protocols like HDLC and PPP.
	CO4	Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
	CO5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.
DEEP LEARNING	CO1	Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and Deep Learning
	CO2	Discuss the Neural Network training, various

		random models.
	CO3	Explain the Techniques of Keras, TensorFlow, Theano and CNTK
	CO4	Classify the Concepts of CNN and RNN
	CO5	Implement Interactive Applications of Deep Learning.
DESIGN AND ANALYSIS OF ALGORITHMS	CO1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
	CO2	List and describe various algorithmic approaches and Solve problems using divide and conquer & greedy Method
	CO3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
	CO4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches
	CO5	Demonstrate NP- Completeness theory ,lower bound theory and String Matching
SOFTWARE PROJECT MANAGEMENT (Professional Elective-II)	CO1	Apply the process to be followed in the software development life-cycle models
	CO2	Apply the concepts of project management & planning
	CO3	Implement the project plans through managing people, communications and change
	CO4	Conduct activities necessary to successfully complete and close the Software projects
	CO5	Implement communication, modeling, and construction & deployment practices in software development
DISTRIBUTED SYSTEMS (Professional Elective-II)	CO1	Elucidate the foundations and issues of distributed systems
	CO2	Illustrate the various synchronization issues and global state for distributed systems
	CO3	Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems
	CO4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems
	CO5	Describe the features of peer-to-peer and distributed shared memory systems
INTERNET OF THINGS	CO1	Review Internet of Things (IoT).

(Professional Elective-II)	CO2	Demonstrate various business models relevant to IoT.
	CO3	Construct designs for web connectivity
	CO4	Organize sources of data acquisition related to IoT, integrate to enterprise systems.
	CO5	Describe IoT with Cloud technologies.
NETWORK PROGRAMMING (Professional Elective-II)	CO1	Identifying different models and sockets
	CO2	Demonstrate different TCP Echo server functions and I/O models
	CO3	Rationalize IPV4 and IPV6 Socket options
	CO4	Identifying daemon processing and Advanced input and output functions
	CO5	Analyze Broadcasting and multicasting
MEAN STACK DEVELOPMENT (Job Oriented Course)	CO1	Build static web pages using HTML 5 elements.
	CO2	Apply JavaScript to embed programming interface for web pages and also to perform Client side validations
	CO3	Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js
	CO4	Develop JavaScript applications using typescript and work with document database using MongoDB
	CO5	Utilize Angular JS to design dynamic and responsive web pages.
COMPUTER NETWORKS LAB	CO1	Know how reliable data communication is achieved through data link layer.
	CO2	Suggest appropriate routing algorithm for the network.
	CO3	Provide internet connection to the system and its installation.
	CO4	Work on various network management tools
ALGORITHMS FOR EFFICIENT CODING LAB	CO1	Analyze the program execution time
DEEP LEARNING WITH TENSORFLOW	CO1	Implement deep neural networks to solve real world problems
	CO2	Choose appropriate pre-trained model to solve real time problem
	CO3	Interpret the results of two different deep learning models
MEAN STACK	CO1	Develop professional web pages of an application

TECHNOLOGIES- MODULE I- HTML 5, JAVASCRIPT, NODE.JS, EXPRESS.JS, AND TYPESCRIPT (Skill Oriented Course)		using HTML elements like lists, navigations, tables, various form elements, embedded media which includes images, audio, video and CSS Styles.
	CO2	Utilize JavaScript for developing interactive HTML web pages and validate form data.
	CO3	Build a basic web server using Node.js and also working with Node Package Manager (NPM).
	CO4	Build a web server using Express.js
	CO5	Make use of Typescript to optimize JavaScript code by using the concept of strict type checking.
BIG DATA : APACHE SPARK (Skill Oriented Course)	CO1	Develop Map Reduce Programs to analyze large dataset Using Hadoop and Spark
	CO2	Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components
	CO3	Perform the filter, count, distinct, map, flatMap RDD Operations in Spark.
	CO4	Build Queries using Spark SQL
	CO5	Apply Spark joins on Sample Data Sets
	CO6	Make use of sqoop to import and export data from hadoop to database and vice-versa
EMPLOYABILITY SKILLS-II	CO1	Solve various Basic Mathematics problems by following different methods
	CO2	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
	CO3	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
	CO4	Analyze, summarize and present information in quantitative forms including table, graphs and formulas
DEEP LEARNING(MINOR COURSE)	CO1	Implement deep neural networks to solve real world problems
	CO2	Choose appropriate pre-trained model to solve real time problem
	CO3	Interpret the results of two different deep learning models

B.Tech 7th Semester		
Course Name	Course Outcomes	
REINFORCEMENT	CO1	Understand basic concepts of Reinforcement

LEARNING (Professional Elective-III)		learning
	CO2	Identifying appropriate learning tasks for Reinforcement learning techniques
	CO3	Understand various methods and applications of reinforcement learning
SOFT COMPUTING (Professional Elective-III)	CO1	Able to apply fuzzy logic and reasoning to handle uncertainty in engineering problems Make use of genetic algorithms to combinatorial optimization problems
	CO2	Apply artificial intelligence techniques, including search heuristics, knowledge representation, planning and reasoning.
	CO3	Learn and apply the principles of self adopting and self organizing neuro fuzzy inference systems
	CO4	Evaluate and compare solutions by various soft computing approaches for a given problem
CRYPTOGRAPHY AND NETWORK SECURITY (Professional Elective-III)	CO1	Explain different security threats and countermeasures and foundation course of cryptography mathematics.
	CO2	Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography
	CO3	Revise the basic principles of Public key algorithms and Working operations of some Asymmetric key algorithms such as RSA, ECC and some more
	CO4	Design applications of hash algorithms, digital signatures and key management techniques
	CO5	Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL,TSL, and IPsec .
BLOCK CHAIN TECHNOLOGIES (Professional Elective-III)	CO1	Demonstrate the block chain basics, Crypto currency
	CO2	To compare and contrast the use of different private vs. public block chain and use cases
	CO3	Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins
	CO4	Classify Permission Block chain and use cases – Hyper ledger, Corda
	CO5	Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others

SPEECH PROCESSING (Professional Elective-III)	CO1	Understand the speech production and perception process.
	CO2	Analyze speech signals in time and frequency domain.
	CO3	Design and implement algorithms for processing speech signals.
ROBOTIC PROCESS AUTOMATION (Professional Elective-IV)	CO1	Describe RPA, where it can be applied and how it's implemented
	CO2	Describe the different types of variables, Control Flow and data manipulation techniques.
	CO3	Identify and understand Image, Text and Data Tables Automation.
	CO4	Describe how to handle the User Events and various types of Exceptions and strategies
	CO5	Understand the Deployment of the Robot and to maintain the connection.
CLOUD COMPUTING (Professional Elective-IV)	CO1	Illustrate the key dimensions of the challenge of Cloud Computing
	CO2	Classify the Levels of Virtualization and mechanism of tools.
	CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
	CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
	CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application
BIG DATA ANALYTICS (Professional Elective-IV)	CO1	Illustrate big data challenges in different domains including social media, transportation, finance and medicine
	CO2	Use various techniques for mining data stream
	CO3	Design and develop Hadoop
	CO4	Identify the characteristics of datasets and compare the trivial data and big data for various applications
	CO5	Explore the various search methods and visualization techniques
NOSQL DATABASES (Professional Elective-IV)	CO1	Discuss about Aggregate Data Models
	CO2	Explain about Master-Slave Replication, Peer-to-Peer Replication
	CO3	Describe the Structure of Data, Scaling, Suitable Use Cases

	CO4	Make use of Complex Transactions Spanning Different Operations
	CO5	Identify Routing, Dispatch and Location-Based Services
VIDEO ANALYTICS (Professional Elective-IV)	CO1	Design video analytic algorithms for security applications
	CO2	Design video analytic algorithms for business intelligence
	CO3	Design custom made video analytics system for the given target application
SOCIAL NETWORK ANALYSIS (Professional Elective-V)	CO1	Know basic notation and terminology used in network science
	CO2	Be able to visualize, summarize and compare networks
	CO3	Illustrate basic principles behind network analysis algorithms
	CO4	Develop practical skills of network analysis in R programming language
	CO5	Be capable of analyzing real work networks
RECOMMENDER SYSTEMS (Professional Elective-V)	CO1	Understand the basic concepts of recommender systems
	CO2	Carry out performance evaluation of recommender systems based on various metrics
	CO3	Implement machine-learning and data-mining algorithms in recommender systems data sets.
	CO4	Design and implement a simple recommender system.
AI CHATBOTS (Professional Elective-V)	CO1	Develop an in-depth understanding of conversation design, including on boarding, flows, utterances, entities, and personality.
	CO2	Design, build, test, and iterate a fully-functional, interactive chatbot using a commercial platform.
	CO3	Deploy the finished chatbot for public use and interaction.
OBJECT ORIENTED ANALYSIS AND DESIGN (Professional Elective-V)	CO1	Analyze the nature of complex system and its solutions.
	CO2	Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships
	CO3	Analyze & Design Class and Object Diagrams that represent Static Aspects of a Software System and apply basic and Advanced Structural Modeling Concepts for designing real time

		applications
	CO4	Analyze & Design behavioral aspects of a Software System using Use Case, Interaction and Activity Diagrams.
	CO5	Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.
SEMANTIC WEB (Professional Elective-V)	CO1	Demonstrate social network analysis and measures.
	CO2	Analyze random graph models and navigate social networks dat
	CO3	Apply the network topology and Visualization tools.
	CO4	Analyze the experiment with small world models and clustering model
	CO5	Compare the application driven virtual communities from social network Structure.
API AND MICROSERVICES (Job Oriented Course)	CO1	Develop a Spring Data JPA application with Spring Boot
	CO2	Implement CRUD operations using Spring Data JPA
	CO3	Implement pagination and sorting mechanism using Spring Data JPA
	CO4	Implement query methods for querying the database using Spring Data JPA
	CO5	Implement a custom repository to customize a querying mechanism using Spring Data JPA
	CO6	Understand update operation using query approaches in Spring Data JPA
	CO7	Implement Spring Transaction using Spring Data JPA
	CO8	Develop RESTful endpoints using Spring REST Processing URI parameters
	CO9	Write RESTful services using Spring REST that consumes and produces data in different formats
	CO10	Handle exceptions and errors in Spring REST endpoints
	CO11	Write Spring based REST clients to consume RESTful services programmatically
	CO12	Create secure RESTful endpoints using Spring Security Document and version the Spring REST endpoints Implement CORS in a Spring REST

		application
SECURE CODING TECHNIQUES (Job Oriented Course)	CO1	Differentiate the objectives of information security
	CO2	Understand the trend, reasons and impact of the recent Cyber attacks
	CO3	Understand OWASP design principles while designing a web application
	CO4	Understand Threat modelling
	CO5	Importance of security in all phases of SDLC
	CO6	Write secure coding using some of the practices in C/C++/Java and Python programming languages
UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY	CO1	<p>By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. This is only an introductory foundational input. It would be desirable to follow it up by</p> <p>a) faculty-student or mentor-mentee programs throughout their time with the institution</p> <p>b) Higher level courses on human values in every aspect of living. E.g. as a professional</p>
MEAN STACK TECHNOLOGIES- MODULE II- ANGULAR JS AND MONGODB (Skill Oriented Course)	CO1	Build a component-based application using Angular components and enhance their functionality using directives.
	CO2	Utilize data binding for developing Angular forms and bind them with model data.
	CO3	Apply Angular built-in or custom pipes to format the rendered data.
	CO4	Develop a single page application by using synchronous or asynchronous Angular routing.
	CO5	Make use of MongoDB queries to perform CRUD operations on document database.
REINFORCEMENT LEARNING(MINOR)	CO1	Understand basic concepts of Reinforcement learning

COURSE)	CO2	Identifying appropriate learning tasks for Reinforcement learning techniques
	CO3	Understand various methods and applications of reinforcement learning

**DEPARTMENT OF CSE -Data Science Course
Outcomes(R20)**

CSE -Data Science Course Outcomes(R20)

B.Tech 1stSem		
Course Name	Course Outcomes	
Communicative English(HS1101)	CO1	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
	CO2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
	CO3	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
	CO4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
	CO5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.
Mathematics – I (BS1101)	CO1	Utilize mean value theorems to real life problems (L3)
	CO2	Solve the differential equations related to various engineering fields (L3)
	CO3	Familiarize with functions of several variables which is useful in optimization (L3)
	CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems(L5)
	CO5	Apply double integration techniques in evaluating areas bounded by region (L3)
Applied Chemistry(BS1102)	CO1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.
	CO2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
	CO3	Summarize the preparation of semiconductors; analyze the applications of liquid crystals and

		superconductors.
	CO4	Analyze the principles of different analytical instruments and their applications.
	CO5	Obtain the knowledge of computational chemistry and molecular machines
Programming for Problem Solving using C (ES1101)	CO1	To write algorithms and to draw flowcharts for solving problems
	CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
	CO3	To use different operators, data types and write programs that use two-way/ multi-way selection.
	CO4	To select the best loop construct for a given problem
	CO5	To decompose a problem into functions and to develop modular reusable code
	CO6	To apply File I/O operations
	CO7	To design and implement programs to analyze the different pointer applications
Computer Engineering Workshop (ES1102)	CO1	Assemble and disassemble components of a PC
	CO2	Construct a fully functional virtual machine, Summarize various Linux operating system commands,.
	CO3	Recognize characters & extract text from scanned images, Create audio files and podcasts

Programming for Problem Solving using C Lab (ES1103)	CO1	To write algorithms and to draw flowcharts for solving problems
	CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
	CO3	To use different operators, data types and write programs that use two-way/ multi-way selection
	CO4	To select the best loop construct for a given problem
	CO5	To design and implement programs to analyze the different pointer applications
	CO6	To decompose a problem into functions and to develop modular reusable code
	CO7	To apply File I/O operations

B.Tech2ndSem	
Course Name	Course Outcomes

MATHEMATICS - II (BS1201)	CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6).
	CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3).
	CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms (L5).
	CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3).
	CO5	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3).
APPLIED PHYSICS (BS1202)	CO1	Explain the need of coherent sources and the conditions for sustained interference (L2). Identify the applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2). Classify ordinary refracted light and extraordinary refracted rays by their states of polarization (L2) .
	CO2	Explain various types of emission of radiation (L2). Identify the role of laser in engineering applications (L3). Describe the construction and working principles of various types of lasers (L1). Explain the working principle of optical fibers (L2). Classify optical fibers based on refractive index profile and mode of propagation (L2). Identify the applications of optical fibers in medical, communication and other fields (L2). Apply the fiber optic concepts in various fields (L3).
	CO3	Describe the dual nature of matter (L1). Explain the significance of wave function (L2). Identify the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). Identify the role of classical and quantum free electron theory in the study of electrical conductivity (L3). Classify the energy bands of solids (L2).
	CO4	Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Claussius-Mosotti relation in dielectrics (L2). Classify the magnetic materials based on susceptibility and their temperature dependence (L2). Explain the applications of dielectric and magnetic materials

		(L2). Apply the concept of magnetism to magnetic devices (L3).
	CO5	Outline the properties of charge carriers in semiconductors (L2). Identify the type of semiconductor using Hall effect (L2). Identify applications of semiconductors in electronic devices (L2). Classify superconductors based on Meissner's effect (L2). Explain Meissner's effect, BCS theory & Josephson effect in superconductors (L2).
DIGITAL LOGIC DESIGN (ES1201)	CO1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
	CO2	An ability to understand the different switching algebra theorems and apply them for logic functions.
	CO3	. An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
	CO4	Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.
	CO5	Students will be able to design various sequential circuits starting from flip-flop to registers and counters.
PYTHON PROGRAMMING (ES1202)	CO1	Develop essential programming skills in computer programming concepts like data types, containers .
	CO2	Apply the basics of programming in the Python language.
	CO3	Solve coding tasks related conditional execution, loops
	CO4	Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming.
DATA STRUCTURES (CS1201)	CO1	• Summarize the properties, interfaces, and behaviors of basic abstract data types .
	CO2	Discuss the computational efficiency of the principal algorithms for sorting & searching.
	CO3	Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs.

	CO4	Demonstrate different methods for traversing trees.
PYTHON PROGRAMMING LAB	CO1	Write, Test and Debug Python Programs .
	CO2	Use Conditionals and Loops for Python Programs.
	CO3	Use functions and represent Compound data using Lists, Tuples and Dictionaries.
	CO4	Use various applications using python.
DATA STRUCTURES LAB (CS1202)	CO1	. Use basic data structures such as arrays and linked list.
	CO2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths
	CO3	Use various searching and sorting algorithms.
CONSTITUTION OF INDIA (MC1201)	CO1	Understand historical background of the constitution making and its importance for building a democratic India.
	CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
	CO3	. Understand the value of the fundamental rights and duties for becoming good citizen of India.
	CO4	.Analyze the decentralization of power between central, state and local self-government.
		Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Panchayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission

B.Tech 3rdSem		
Course Name	Course Outcomes	
MATHEMATICS - III	CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence (L5) .
	CO2	Estimate the work done against a field, circulation and flux using vector calculus (L5).
	CO3	Apply the Laplace transform for solving differential

		equations (L3).
	CO4	Find or compute the Fourier series of periodic signals (L3).
	CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3).
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1	Demonstrate skills in solving mathematical problems .
	CO2	Comprehend mathematical principles and logic.
	CO3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.
	CO4	Manipulate and analyze data numerically and/or graphically using appropriate Software.
	CO5	Communicate effectively mathematical ideas/results verbally or in writing.
FUNDAMENTALS OF DATA SCIENCE	CO1	Apply principles of NumPy and Pandas to the analysis of data..
	CO2	Make use of various file formats in loading and storage of data.
	CO3	Identify and apply the need and importance of pre-processing techniques.
	CO4	Show the results and present them in a pictorial format.
DATABASE MANAGEMENT SYSTEMS	CO1	Describe a relational database and object-oriented database
	CO2	Create, maintain and manipulate a relational database using SQL.
	CO3	Describe ER model and normalization for database design.
	CO4	Examine issues in data storage and query processing and can formulate appropriate solutions.
	CO5	Examine issues in data storage and query processing and can formulate appropriate solutions
FUNDAMENTALS OF DATA SCIENCE(LAB)	CO1	Perform various operations on NumPy .
	CO2	Importing data from different file formats using pandas.
	CO3	Draw different types of charts using matplotlib.

OBJECT ORIENTED PROGRAMMING WITH JAVA LAB	CO1	Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings
	CO2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.
	CO3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
DATABASE MANAGEMENT SYSTEMS LAB	CO1	Utilize SQL to execute queries for creating database and performing data manipulation operations .
	CO2	Examine integrity constraints to build efficient databases.
	CO3	Apply Queries using Advanced Concepts of SQL.
	CO4	Build PL/SQL programs including stored procedures, functions, cursors and triggers.
MOBILE APP DEVELOPMENT	CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms .
	CO2	Critique mobile applications on their design pros and cons.
	CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
	CO4	. Program mobile applications for the Android operating system that use basic and advanced phone features and.
	CO5	Deploy applications to the Android marketplace for distribution.
ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	CO1	Understand the significance of Indian Traditional Knowledge .
	CO2	Classify the Indian Traditional Knowledge.
	CO3	. Compare Modern Science with Indian Traditional Knowledge system.
	CO4	Analyze the role of Government in protecting the Traditional Knowledge.
	CO5	Understand the impact of Philosophical tradition on Indian Knowledge System.

Course Name	Course Outcomes	
PROBABILITY AND STATISTICS	CO1	. Classify the concepts of data science and its importance .
	CO2	Interpret the association of characteristics and through correlation and regression tools.
	CO3	. Make use of the concepts of probability and their applications.
	CO4	Apply discrete and continuous probability distributions.
	CO5	Infer the statistical inferential methods based on small and large sampling tests.
COMPUTER ORGANIZATION	CO1	.• Develop a detailed understanding of computer .
	CO2	Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations.
	CO3	Develop a detailed understanding of architecture and functionality of central processing unit.
	CO4	Exemplify in a better way the I/O and memory organization.
	CO5	Illustrate concepts of parallel processing, pipelining and inter processor communication.
DATA WAREHOUSING AND MINING	CO1	Summarize the architecture of data warehouse .
	CO2	Apply different preprocessing methods, Similarity, Dissimilarity measures for any given raw data.
	CO3	Construct a decision tree and resolve the problem of model over fitting.
	CO4	Compare Apriorism and FP-growth association rule mining algorithms for frequent item set generation.
	CO5	Apply suitable clustering algorithm for the given data set.
FORMAL LANGUAGES AND AUTOMATA THEORY	CO1	Classify machines by their power to recognize languages.
	CO2	Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy.
	CO3	Employ finite state machines to solve problems in computing.
	CO4	Illustrate deterministic and non-deterministic machines.
	CO5	Quote the hierarchy of problems arising in the computer science.
MANAGERIAL	CO1	The Learner is equipped with the knowledge of

ECONOMICS AND FINANCIAL ACCOUNTANCY		estimating the Demand and demand elasticities for a product .
	CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
	CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
	CO4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
	CO5	. The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
R PROGRAMMING LAB	CO1	Implement basic concepts of R programming, and its different module that includes conditional, looping, lists, Strings, Functions, Frames, Arrays, and File programming.
	CO2	. Implement the concepts of R Script to extract the data from data frames and file operations.
	CO3	Implement the various statistical techniques using R.
	CO4	Extend the functionality of R by using add-on packages.
	CO5	Use R Graphics and Tables to visualize results of various statistical operations on data.
DATA MINING USING PYTHON LAB	CO1	. Apply preprocessing techniques on real world
	CO2	. Apply apriorism algorithm to generate frequent itemset
	CO3	Apply Classification and clustering algorithms on different datasets.
WEB APPLICATION DEVELOPMENT LAB	CO1	Develop Single Page Applications
	CO2	Develop NodeJS & ReactJS Reusable Service • Store the data in MySQL.
	CO3	Get acquainted with the latest web application development trends in the IT industry

MONGO DB	CO1	. Installing and configuring mongo DB in windows
	CO2	Perform all database operations using MongoDB.
	CO3	Develop applications by integrating mongo DB with java/PHP.

B.Tech5thSem		
Course Name	Course Outcomes	
COMPILER DESIGN	CO1	Demonstrate phases in the design of compiler .
	CO2	Organize Syntax Analysis, Top Down and LL(1) grammars.
	CO3	Design Bottom Up Parsing and Construction of LR parsers.
	CO4	Analyze synthesized, inherited attributes and syntax directed translation schemes.
	CO5	Determine algorithms to generate code for a target machine.
OPERATING SYSTEMS	CO1	Describe various generations of Operating System and functions of Operating System .
	CO2	. Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance.
	CO3	Solve Inter Process Communication problems using Mathematical Equations by various methods.
	CO4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques.
	CO5	• Outline File Systems in Operating System like UNIX/Linux and Windows.
MACHINE LEARNING	CO1	Explain the fundamental usage of the concept Machine Learning system.

	CO2	Demonstrate on various regression Technique.
	CO3	Analyze the Ensemble Learning Methods • Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
	CO4	Discuss the Neural Network Models and Fundamentals concepts of Deep Learning.
	CO5	Explain the fundamental usage of the concept Machine Learning system .
OPTIMIZATION IN OPERATIONS RESEARCH (Job oriented course)	CO1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem. optimal solution.
	CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
	CO3	Apply and Solve transportation and assignment problem by using Linear programming Simplex method..
	CO4	Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
	CO5	Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.
SOFTWARE ENGINEERING (Professional Elective-I)	CO1	Ability to transform an Object-Oriented Design into high quality, executable code .
	CO2	Skills to design, implement, and execute test cases at the Unit and Integration level.
	CO3	Compare conventional and agile software methods.

OBJECT ORIENTED ANALYSIS AND DESIGN (Professional Elective-I)	CO1	Analyze the nature of complex system and its solutions.
	CO2	Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships.
	CO3	Analyze & Design Class and Object Diagrams that represent Static Aspects of a Software System and

		apply basic and Advanced Structural Modeling Concepts for designing real time applications.
	CO4	Analyze & Design behavioral aspects of a Software System using Use Case, Interaction and Activity Diagrams.
	CO5	Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.
DevOps (Professional Elective-I)	CO1	. Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility.
	CO2	. Describe DevOps & Dev SecOps methodologies and their key concepts.
	CO3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models.
	CO4	Set up complete private infrastructure using version control systems and CI/CD tools.
	CO5	Acquire the knowledge of maturity model, Maturity Assessment.
	CO1	Review Internet of Things (IoT).
INTERNET OF THINGS (Professional Elective-I)	CO2	Demonstrate various business models relevant to IoT.
	CO3	Construct designs for web connectivity.
	CO4	Organize sources of data acquisition related to IoT, integrate to enterprise systems.
	CO5	Describe IoT with Cloud technologies.
OPERATING SYSTEMS & COMPILER DESIGN LAB	CO1	Implement various scheduling, page replacement algorithms and algorithms related to deadlocks .
	CO2	Design programs for shared memory management and semaphores.
	CO3	Determine predictive parsing table for a CFG.
	CO4	Apply Lex and Yuck tools
	CO5	Examine LR parser and generating SLR Parsing table.
	CO5	Describe IoT with Cloud technologies.

MACHINE LEARNING LAB	CO1	Implement procedures for the machine learning algorithms
	CO2	. Design and Develop Python programs for various Learning algorithms.
	CO3	Apply appropriate data sets to the Machine Learning algorithms.

	CO4	Develop Machine Learning algorithms to solve real world problems.
CONTINUOUS INTEGRATION AND CONTINUOUS DELIVERY USING DevOps	CO1	Understand the why, what and how of DevOps adoption .
	CO2	Attain literacy on DeVos.
	CO3	Align capabilities required in the team.
	CO4	. Create an automated CICD pipeline using a stack of tools.
HELICAL INSIGHT (Skill Oriented Course III)	CO1	develop data analysis on top of your data and embed it .
	CO2	support better business decision-making.
	CO3	implement their own custom business processes very easily.
EMPLOYABILITY SKILLS-I	CO1	. Understand the corporate etiquette.
	CO2	. Make presentations effectively with appropriate body language.
	CO3	. Be composed with positive attitude.
DATA WAREHOUSING AND DATA MINING(Minor course)	CO1	Design a data mart or data warehouse for any organization.
	CO2	Extract knowledge using data mining techniques and enlist various algorithms used in information analysis of Data Mining Techniques.
	CO3	Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification for realistic data.
	CO4	Implement and Analyze on knowledge flow application on data sets and Apply the suitable visualization techniques to output analytical results.

B.Tech6thSem		
Course Name	Course Outcomes	
COMPUTER NETWORKS	CO1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
	CO2	Discuss different transmission media and different switching networks.
	CO3	Analyze data link layer services, functions and protocols like HDLC and PPP.
	CO4	. Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
	CO5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.
BIG DATA ANALYTICS	CO1	Illustrate big data challenges in different domains including social media, transportation, finance and medicine t
	CO2	Use various techniques for mining data stream.
	CO3	Design and develop Hadoop.
	CO4	Identify the characteristics of datasets and compare the trivial data and big data for various applications.
	CO5	. Explore the various search methods and visualization techniques.
DESIGN AND ANALYSIS OF ALGORITHMS	CO1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms .
	CO2	. List and describe various algorithmic approaches and Solve problems using divide and conquer & greedy Method.
	CO3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
	CO4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches.
	CO5	Demonstrate NP- Completeness theory ,lower bound theory and String Matching.
DEEP LEARNING	CO1	Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine

(Professional Elective-II)		Learning and Deep Learning.
	CO2	Discuss the Neural Network training, various random models.
	CO3	Explain the Techniques of Kera's, TensorFlow, Theano and CNTK.
	CO4	Classify the Concepts of CNN and RNN.
	CO5	Implement Interactive Applications of Deep Learning..
SOFTWARE PROJECT MANAGEMENT (Professional Elective-II)	CO1	Apply the process to be followed in the software development life-cycle models .
	CO2	Apply the concepts of project management & planning.
	CO3	Implement the project plans through managing people, communications and change.
	CO4	Conduct activities necessary to successfully complete and close the Software projects.
	CO5	Implement communication, modeling, and construction & deployment practices in software development.
DISTRIBUTED SYSTEMS (Professional Elective-II)	CO1	Elucidate the foundations and issues of distributed systems .
	CO2	Illustrate the various synchronization issues and global state for distributed systems.
	CO3	Illustrate the Mutual Exclusion and Dead lock detection algorithms in distributed systems.
	CO4	systems Describe the agreement protocols and fault tolerance mechanisms in distributed systems.
	CO5	Describe the features of peer-to-peer and distributed shared memory systems.
DATA WRANGLING IN DATA SCIENCE (Professional Elective-II)	CO1	Identify and execute the basic data format.
	CO2	. Perform the computations with Excel and pdf files.
	CO3	Understand the concepts of data cleanup.
	CO4	Explore and analyze the Image and video data.
	CO5	Understand the concepts web scraping.
ETL PRINCIPLES (Professional Elective-II)s	CO1	Understand the basic principles of ETL .
	CO2	Understand various processes like extraction, cleaning, conforming etc.

MEAN STACK DEVELOPMENT (Job Oriented Course)	CO1	Build static web pages using HTML 5 elements.
	CO2	. Apply JavaScript to embed programming interface for web pages and also to perform Client side validations.
	CO3	Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js.
	CO4	Develop JavaScript applications using typescript and work with document database using MongoDB.
	CO5	Utilize Angular JS to design dynamic and responsive web pages.
COMPUTER NETWORKS LAB	CO1	end of the course student will be able to .
	CO2	Know how reliable data communication is achieved through data link layer.
	CO3	Suggest appropriate routing algorithm for the network.
	CO4	Provide internet connection to the system and its installation.
	CO5	Work on various network management tools.
DEEP LEARNING WITH TENSORFLOW	CO1	Implement deep neural networks to solve real world problems .
	CO2	Choose appropriate pre-trained model to solve real time problem.
	CO3	Interpret the results of two different deep learning models.
ETL DESIGN PROCEDURES-SPARK (Skill Oriented Course)	CO1	Develop various applications for ETL with Spark.
EMPLOYABILITY SKILLS-II	CO1	. Solve various Basic Mathematics problems by following different methods .
	CO2	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems.
	CO3	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
	CO4	Analyze, summarize and present information in

		quantitative forms including table, graphs and formulas.
DATA SCIENCE APPLICATIONS	CO1	Apply principles of NumPy and Pandas to the analysis of data.
	CO2	Make use of various file formats in loading and storage of data.
	CO3	Identify and apply the need and importance of pre-processing techniques.
	CO4	<ul style="list-style-type: none"> Show the results and present them in a pictorial format.

B.Tech7thSem		
Course Name	Course Outcomes	
Reinforcement Learning (Professional Elective-III)	CO1	Understand basic concepts of Reinforcement learning
	CO2	Identifying appropriate learning tasks for Reinforcement learning techniques.
	CO3	Understand various methods and applications of reinforcement learning.
Nature Inspired Computing Techniques (Professional Elective-III)	CO1	Understand the strengths, weaknesses and appropriateness of nature-inspired algorithms
	CO2	Apply nature-inspired algorithms to optimization, design and learning problems.
Social Media Analytics (Professional Elective-III)	CO1	Understand social media categories and types of social media analytics .
	CO2	Understand the impact of social media analytics integration with and affects other areas of business.
Block Chain Technologies	CO1	Demonstrate the block chain basics, Crypto

(Professional Elective-III)		currency .
	CO2	To compare and contrast the use of different private vs. public block chain and use cases.
	CO3	.Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins.
	CO4	Classify Permission Block chain and use cases – Hyper ledger, Corda.
	CO5	Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and other.
SnowFlake Cloud Analytics (Professional Elective-IV)	CO1	Load & transform data in Snowflake .
	CO2	scale virtual warehouses for performance and concurrency.
	CO3	share data and work with semi-structured data.
	CO4	gain a thorough knowledge of query constructs, DDL & DML operations, managing and monitoring Snowflake accounts and Snowflake's continuous data protection methods.
Cloud Computing (Professional Elective-IV)	CO1	Illustrate the key dimensions of the challenge of Cloud Computing .
	CO2	Classify the Levels of Virtualization and mechanism of tools.
	CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.
	CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
	CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application.
Information Retrieval Systems (Professional Elective-IV)	CO1	Identify basic theories in information retrieval .
	CO2	.Classify the analysis tools as they apply to information retrieval systems.
	CO3	Illustrate the problems solved in currentIR systems.
	CO4	.Discuss the advantages of current IR systems
		Translatethelatesttechnologiesfor linking, describing and searching the web.
NOSQL Databases (Professional Elective-IV)	CO1	Discuss about Aggregate Data Models .
	CO2	Explain about Master-Slave Replication, Peer-to-Peer Replication.
	CO3	Describe the Structure of Data, Scaling, Suitable Use Cases.

	CO4	Make use of Complex Transactions Spanning Different Operations.
Social Network Analysis (Professional Elective-V)	CO1	Knowbasic
	CO2	Beabletovisualize, summarizeandcomparenetwork.
	CO3	Illustratebasicprinciplesbehind networkanalysisalgorithms.
	CO4	Developpracticalskillsnetwork analysis inRprogramminglanguage.
Recommender Systems (Professional Elective-V)	CO1	Understand the basic concepts of recommender systems .
	CO2	Carry out performance evaluation of recommender systems based on various metrics.
	CO3	Implement machine-learning and data-mining algorithms in recommender systems data sets.
	CO4	Design and implement a simple recommender system.

AI Chatbots (Professional Elective-V)	CO1	Develop an in-depth understanding of conversation design, including onboarding, flows, utterances, entities, and personality.
	CO2	Design, build, test, and iterate a fully-functional, interactive chatbot using a commercial platform.
	CO3	Deploy the finished chatbot for public use and interaction.
Data Visualization (Professional Elective-V)	CO1	Understand basics of Data Visualization
	CO2	Implement visualization of distributions.
	CO3	Write programs on visualization of time series, proportions & associations.
	CO4	Apply visualization on Trends and uncertainty.
	CO5	Explain principles of proportions.
API and Microservices (Job Oriented Course)	CO1	Develop a Spring Data JPA application with Spring Boot
	CO2	Implement CRUD operations using Spring Data JPA.
	CO3	Implement pagination and sorting mechanism using Spring Data JPA.
	CO4	Implement query methods for querying the database using Spring Data JPA.
	CO5	Understand update operation using query approaches

		in Spring Data JPA.
	CO6	Write RESTful services using Spring REST that consumes and produces data in different formats.
	CO7	Write Spring based REST clients to consume RESTful services programmatically.
Secure Coding Techniques (Job Oriented Course)	CO1	Differentiate the objectives of information security
	CO2	Understand the trend, reasons and impact of the recent Cyber attacks.
	CO3	Understand OWASP design principles while designing a web application.
	CO4	Understand Threat modelling.
	CO5	Importance of security in all phases of SDLC.
Universal Human Values 2: Understanding Harmony	CO1	By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature
	CO2	they would become more responsible in life, and in handling problems with sustainable solutions.
	CO3	while keeping human relationships and human nature in mind.
	CO4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
	CO5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
MEAN Stack Technologies-Module II-Angular JS and MongoDB (Skill Oriented Course)	CO1	Build a component-based application using Angular components and enhance their functionality using directives.
	CO2	Utilize data binding for developing Angular forms and bind them with model data.
	CO3	Apply Angular built-in or custom pipes to format the rendered data.
	CO4	Develop a single page application by using synchronous or asynchronous Angular routing
	CO5	Make use of MongoDB queries to perform CRUD operations on document database.
Data Wrangling in Data Science(Minor)	CO1	Identify and execute the basic data format.
	CO2	Perform the computations with Excel and pdf files.
	CO3	Understand the concepts of data cleanup.
	CO4	Explore and analyze the Image and video data.

	CO5	Understand the concepts web scraping.
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DEPARTMENT OF CSE Courses Outcomes(R20)

CSE Courses Outcomes(R20)

B.tech 1st Sem		
Course Name	Course Outcomes	
COMMUNICATIVE ENGLISH	CO1	Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
	CO2	ask and answer general questions on familiar topics and introduce oneself/others
	CO3	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
	CO4	Recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
	CO5	Form sentences using proper grammatical structures and correct word forms
MATHEMATICS-I	CO1	Utilize mean value theorems to real life problems
	CO2	Solve the differential equations related to various engineering fields
	CO3	Familiarize with functions of several variables which is useful in optimization
	CO4	Apply double integration techniques in evaluating areas bounded by region
	CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems
APPLIED PHYSICS	CO1	Explain the need of coherent sources and the conditions for sustained interference (L2). Identify the applications of interference in engineering (L3). Analyze the differences between interference and diffraction with applications (L4). Illustrate the concept of polarization of light and its applications (L2). Classify ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)
	CO2	Explain various types of emission of radiation (L2). Identify the role of laser in engineering applications (L3). Describe the construction and working principles of various types of lasers (L1). Explain the working principle of optical fibers (L2). Classify optical fibers based on refractive index profile and mode of propagation (L2). Identify the applications of optical fibers in medical, communication and other

		fields (L2). Apply the fiber optic concepts in various fields (L3).
	CO3	Describe the dual nature of matter (L1). Explain the significance of wave function (L2). Identify the role of Schrodinger's time independent wave equation in studying particle in onedimensional infinite potential well (L3). Identify the role of classical and quantum free electron theory in the study of electrical conductivity (L3). Classify the energy bands of solids (L2).
	CO4	Explain the concept of dielectric constant and polarization in dielectric materials (L2). Summarize various types of polarization of dielectrics (L2). Interpret Lorentz field and Claussius-Mosotti relation in dielectrics (L2). Classify the magnetic materials based on susceptibility and their temperature dependence (L2). Explain the applications of dielectric and magnetic materials (L2). Apply the concept of magnetism to magnetic devices (L3)
	CO5	Outline the properties of charge carriers in semiconductors (L2). Identify the type of semiconductor using Hall effect (L2). Identify applications of semiconductors in electronic devices (L2). Classify superconductors based on Meissonier's effect (L2). Explain Meissonier's effect, BCS theory & Josephson effect in superconductors (L2).
PROGRAMMING FOR PROBLEM SOLVING USING C	CO1	To write algorithms and to draw flowcharts for solving problems
	CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
	CO3	To use different operators, data types and write programs that use two-way/ multi-way selection
	CO4	To select the best loop construct for a given problem
	CO5	To design and implement programs to analyze the different pointer applications
	CO6	To decompose a problem into functions and to develop modular reusable code
	CO7	To apply File I/O operations
COMPUTER ENGINEERING WORKSHOP	CO1	Assemble and disassemble components of a PC
	CO2	Construct a fully functional virtual machine, Summarize various Linux operating system commands,
	CO3	Recognize characters & extract text from scanned images, Create audio files and podcasts

PROGRAMMING FOR PROBLEM SOLVING USING C LAB	CO1	Gains Knowledge on various concepts of a C language.
	CO2	Able to draw flowcharts and write algorithms.
	CO3	Able design and development of C problem solving skills.
	CO4	Able to design and develop modular programming skills.
	CO5	Able to trace and debug a program

B.tech 2nd Sem		
Course Name	Course Outcomes	
MATHEMATICS-II	CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications
	CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel
	CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms
	CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals
	CO5	apply numerical integral techniques to different Engineering problems
	CO6	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations
APPLIED CHEMISTRY	CO1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers
	CO2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion
	CO3	Synthesize nonmaterial's for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
	CO4	Analyze the principles of different analytical instruments and their applications. Design models for energy by different natural sources
	CO5	Obtain the knowledge of computational chemistry

		and molecular machines
COMPUTER ORGANIZATION	CO1	Demonstrate and understanding of the design of the functional units of a digital computer system.
	CO2	Relate Postulates of Boolean algebra and minimize combinational functions
	CO3	Recognize and manipulate representations of numbers stored in digital computers
	CO4	Build the logic families and realization of logic gates.
	CO5	Design and analyze combinational and sequential circuits
	CO6	Recall the internal organization of computers, CPU, memory unit and Input/Outputs and the relations between its main components
	CO7	Solve elementary problems by assembly language programming
PYTHON PROGRAMMING	CO1	Develop essential programming skills in computer programming concepts like data types, containers
	CO2	Apply the basics of programming in the Python language
	CO3	Solve coding tasks related conditional execution, loops
	CO4	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming
DATA STRUCTURES	CO1	Summarize the properties, interfaces, and behaviors of basic abstract data types
	CO2	Discuss the computational efficiency of the principal algorithms for sorting & searching
	CO3	Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs
	CO4	Demonstrate different methods for traversing trees
APPLIED CHEMISTRY LAB	CO1	The students entering into the professional course have practically very little exposure to lab classes.
	CO2	The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis.
	CO3	Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments.
	CO4	They thus acquire some experimental skills.
SPYTHON	CO1	Develop essential programming skills in computer

PROGRAMMING LAB		programming concepts like data types, containers
	CO2	Apply the basics of programming in the Python language
	CO3	Solve coding tasks related conditional execution, loops
	CO4	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming
DATA STRUCTURES LAB	CO1	Use basic data structures such as arrays and linked list.
	CO2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
	CO3	Use various searching and sorting algorithms.

B.tech 3rd Sem		
Course Name	Course Outcomes	
MATHEMATICS - III	CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence
	CO2	Estimate the work done against a field, circulation and flux using vector calculus
	CO3	Apply the Laplace transform for solving differential equations
	CO4	Find or compute the Fourier series of periodic signals
	CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
	CO6	Identify solution methods for partial differential equations that model physical processes
OBJECT ORIENTED PROGRAMMING THROUGH C++	CO1	Classify object oriented programming and procedural programming
	CO2	Apply C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling
	CO3	Build C++ classes using appropriate encapsulation and design principles

	CO4	Apply object oriented or non-object oriented techniques to solve bigger computing problems
OPERATING SYSTEMS	CO1	Describe various generations of Operating System and functions of Operating System
	CO2	Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance
	CO3	Solve Inter Process Communication problems using Mathematical Equations by various methods
	CO4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques
	CO5	Outline File Systems in Operating System like UNIX/Linux and Windows
SOFTWARE ENGINEERING	CO1	Ability to transform an Object-Oriented Design into high quality, executable code
	CO2	Skills to design, implement, and execute test cases at the Unit and Integration level
	CO3	Compare conventional and agile software methods
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1	Demonstrate skills in solving mathematical problems
	CO2	Comprehend mathematical principles and logic
	CO3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
	CO4	Manipulate and analyze data numerically and/or graphically using appropriate Software
	CO5	Communicate effectively mathematical ideas/results verbally or in writing
OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB	CO1	Apply the various OOPs concepts with the help of programs.
OPERATING SYSTEM LAB	CO1	To use Unix utilities and perform basic shell control of the utilities
	CO2	To use the Unix file system and file access control
	CO3	To use of an operating system to develop software
	CO4	Students will be able to use Linux environment efficiently
	CO5	Solve problems using bash for shell scripting

SOFTWARE ENGINEERING LAB	CO1	By the end of this lab the student is able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project
	CO2	prepare SRS document, design document, test cases and software configuration management and risk management related document.
	CO3	develop function oriented and object oriented software design using tools like rational rose.
	CO4	use modern engineering tools necessary for software project management, estimations, time management and software reuse
	CO5	generate test cases for software testing
APPLICATIONS OF PYTHON-NumPy	CO1	Explain how data is collected, managed and stored for processing
	CO2	Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems
	CO3	Understand how to apply some linear algebra operations to n-dimensional arrays
	CO4	Use NumPy perform common data wrangling and computational tasks in Python.
WEB APPLICATION DEVELOPMENT USING FULL STACK	CO1	Analyze a web page and identify its elements and attributes.
	CO2	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet
	CO3	Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone
	CO4	Create web pages using HTML and Cascading Style Sheets.
CONSTITUTION OF INDIA	CO1	Understand historical background of the constitution making and its importance for building a democratic India.
	CO2	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
	CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India
	CO4	Analyze the decentralization of power between central, state and local self government.
	CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election

	<p>Commission and UPSC for sustaining democracy.</p> <ol style="list-style-type: none"> 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Pachayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission
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B.tech 4th Sem		
Course Name	Course Outcomes	
PROBABILITY AND STATISTICS	CO1	Classify the concepts of data science and its importance
	CO2	Interpret the association of characteristics and through correlation and regression tools
	CO3	Make use of the concepts of probability and their applications
	CO4	Apply discrete and continuous probability distributions
	CO5	Design the components of a classical hypothesis test
	CO6	Infer the statistical inferential methods based on small and large sampling tests
DATABASE MANAGEMENT SYSTEMS	CO1	Describe a relational database and object-oriented database
	CO2	Create, maintain and manipulate a relational database using SQL
	CO3	Describe ER model and normalization for database design
	CO4	Examine issues in data storage and query processing and can formulate appropriate solutions
	CO5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage
FORMAL LANGUAGES AND AUTOMATA THEORY	CO1	Classify machines by their power to recognize languages.
	CO2	Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy

	CO3	Employ finite state machines to solve problems in computing
	CO4	Illustrate deterministic and non-deterministic machines
	CO5	Quote the hierarchy of problems arising in the computer science
JAVA PROGRAMMING	CO1	Able to realize the concept of Object Oriented Programming & Java Programming Constructs
	CO2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords.
	CO3	Apply the concept of exception handling and Input/ Output operations
	CO4	Able to design the applications of Java & Java applet
	CO5	Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit
MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
	CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
	CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
	CO4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
	CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
DATABASE MANAGEMENT SYSTEMS LAB	CO1	Utilize SQL to execute queries for creating database and performing data manipulation operations
	CO2	Examine integrity constraints to build efficient databases
	CO3	Apply Queries using Advanced Concepts of SQL
	CO4	Build PL/SQL programs including stored procedures, functions, cursors and triggers
R PROGRAMMING LAB	CO1	Access online resources for R and import new function packages into the R workspace
	CO2	Import, review, manipulate and summarize data-sets in R

	CO3	Explore data-sets to create testable hypotheses and identify appropriate statistical tests
	CO4	Perform appropriate statistical tests using R
	CO5	Create and edit visualizations with R
JAVA PROGRAMMING LAB	CO1	Evaluate default value of all primitive data type, Operations, Expressions, Control flow, Strings
	CO2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
	CO3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
	CO4	Construct Threads, Event Handling, implement packages, developing applets
APPLICATIONS OF PYTHON-Pandas	CO1	Use Pandas to create and manipulate data structures like Series and Data Frames.
	CO2	Work with arrays, queries, and data frames
	CO3	Query Data Frame structures for cleaning and processing and manipulating files
	CO4	Understand best practices for creating basic charts
WEB APPLICATION DEVELOPMENT USING FULL STACK	CO1	develop of the major Web application tier- Client side development
	CO2	participate in the active development of cross-browser applications through JavaScript
	CO3	Develop JavaScript applications that transition between states

B.tech 5th Sem		
Course Name	Course Outcomes	
COMPUTER NETWORKS	CO1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
	CO2	Discuss different transmission media and different switching networks.
	CO3	Analyze data link layer services, functions and protocols like HDLC and PPP.
	CO4	Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
	CO5	Determine application layer services and client server

		protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.
DESIGN AND ANALYSIS OF ALGORITHMS	CO1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
	CO2	List and describe various algorithmic approaches and Solve problems using divide and conquer & greedy Method
	CO3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
	CO4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches
	CO5	Demonstrate NP- Completeness theory ,lower bound theory and String Matching
DATA WAREHOUSING AND DATA MINING	CO1	Illustrate the importance of Data Warehousing, Data Mining and its functionalities and Design schema for real time data warehousing applications.
	CO2	Demonstrate on various Data Preprocessing Techniques viz. data cleaning, data integration, data transformation and data reduction and Process raw data to make it suitable for various data mining algorithms.
	CO3	Choose appropriate classification technique to perform classification, model building and evaluation.
	CO4	Make use of association rule mining techniques viz. Apriori and FP Growth algorithms and analyze on frequent item sets generation.
	CO5	Identify and apply various clustering algorithm (with open source tools), interpret, evaluate and report the result.
OPTIMIZATION IN OPERATIONS RESEARCH	CO1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
	CO2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
	CO3	Apply and Solve transportation and assignment problem by using Linear programming Simplex method.
	CO4	Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions

	CO5	Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.
ARTIFICIAL INTELLIGENCE	CO1	Understand the fundamental concepts in Artificial Intelligence
	CO2	Analyze the applications of search strategies and problem reductions
	CO3	Apply the mathematical logic concepts.
	CO4	Develop the Knowledge representations in Artificial Intelligence.
	CO5	Explain the Fuzzy logic systems.
SOFTWARE PROJECT MANAGEMENT	CO1	Apply the process to be followed in the software development life-cycle models
	CO2	Apply the concepts of project management & planning
	CO3	Implement the project plans through managing people, communications and change
	CO4	Conduct activities necessary to successfully complete and close the Software projects
	CO5	Implement communication, modeling, and construction & deployment practices in software development
DISTRIBUTED SYSTEMS	CO1	Elucidate the foundations and issues of distributed systems
	CO2	Illustrate the various synchronization issues and global state for distributed systems
	CO3	Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems
	CO4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems
	CO5	Describe the features of peer-to-peer and distributed shared memory systems
ADVANCED UNIX PROGRAMMING	CO1	Gain good knowledge on Unix commands and awareness of shell programming
	CO2	Know about different system calls for files and directories
	CO3	Ability to know the working of processes and signals
	CO4	Application of client server program for IPC
	CO5	Knowledge about socket programming
DATA WAREHOUSING	CO1	Design a data mart or data warehouse for any

AND DATA MINING LAB		organization
	CO2	Extract knowledge using data mining techniques and enlist various algorithms used in information analysis of Data Mining Techniques
	CO3	Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification for realistic data
	CO4	Implement and Analyze on knowledge flow application on data sets and Apply the suitable visualization techniques to output analytical results
COMPUTER NETWORKS LAB	CO1	Know how reliable data communication is achieved through data link layer.
	CO2	Suggest appropriate routing algorithm for the network.
	CO3	Provide internet connection to the system and its installation.
	CO4	Work on various network management tools
ANIMATION COURSE: ANIMATION DESIGN	CO1	learn various tools of digital 2-D animation
	CO2	understand production pipeline to create 2-D animation.
	CO3	apply the tools to create 2D animation for films and videos
	CO4	understand different styles and treatment of content in 3D model creation
	CO5	apply tools to create effective 3D modeling texturing and lighting
CONTINUOUS INTEGRATION AND CONTINUOUS DELIVERY USING DevOps	CO1	Understand the why, what and how of DevOps adoption
	CO2	Attain literacy on Devops
	CO3	Align capabilities required in the team
	CO4	Create an automated CICD pipeline using a stack of tools
EMPLOYABILITY SKILLS-I	CO1	Understand the corporate etiquette.
	CO2	Make presentations effectively with appropriate body language
	CO3	Be composed with positive attitude
	CO4	Understand the core competencies to succeed in professional and personal life
DATABASE MANAGEMENT SYSTEMS	CO1	Describe a relational database and object-oriented database
	CO2	Create, maintain and manipulate a relational database using SQL

	CO3	Describe ER model and normalization for database design
	CO4	Examine issues in data storage and query processing and can formulate appropriate solutions
	CO5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage
	CO6	Examine integrity constraints to build efficient databases
	CO7	Apply Queries using Advanced Concepts of SQL
	CO8	Build PL/SQL programs including stored procedures, functions, cursors and triggers

B.tech 6th Sem		
Course Name	Course Outcomes	
MACHINE LEARNING	CO1	Explain the fundamental usage of the concept Machine Learning system
	CO2	Demonstrate on various regression Technique
	CO3	Analyze the Ensemble Learning Methods.
	CO4	Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning
	CO5	Discuss the Neural Network Models and Fundamentals concepts of Deep Learning
COMPILER DESIGN	CO1	Demonstrate phases in the design of compiler
	CO2	Organize Syntax Analysis, Top Down and LL(1) grammars
	CO3	Design Bottom Up Parsing and Construction of LR parsers
	CO4	Analyze synthesized, inherited attributes and syntax directed translation schemes
	CO5	Determine algorithms to generate code for a target machine
CRYPTOGRAPHY AND NETWORK SECURITY	CO1	Explain different security threats and countermeasures and foundation course of cryptography mathematics
	CO2	Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography
	CO3	Revise the basic principles of Public key algorithms and Working operations of some Asymmetric key algorithms such as RSA, ECC and some more

	CO4	Design applications of hash algorithms, digital signatures and key management techniques.
	CO5	Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL,TSL, and IPsec .
MOBILE COMPUTING	CO1	Develop a strong grounding in the fundamentals of mobile Networks
	CO2	Apply knowledge in MAC, Network, and Transport Layer protocols of Wireless Network
	CO3	Comprehend, design, and develop a lightweight network stack
	CO4	Analyze the Mobile Network Layer system working
	CO5	Explain about the WAP Model
BIG DATA ANALYTICS	CO1	Illustrate big data challenges in different domains including social media, transportation, finance and medicine
	CO2	Use various techniques for mining data stream
	CO3	Design and develop Hadoop
	CO4	Identify the characteristics of datasets and compare the trivial data and big data for various applications
	CO5	Explore the various search methods and visualization techniques
OBJECT ORIENTED ANALYSIS AND DESIGN	CO1	Analyze the nature of complex system and its solutions.
	CO2	Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships
	CO3	Analyze & Design Class and Object Diagrams that represent Static Aspects of a Software System and apply basic and Advanced Structural Modeling Concepts for designing real time applications.
	CO4	Analyze & Design behavioral aspects of a Software System using Use Case, Interaction and Activity Diagrams.
	CO5	Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.
NETWORK PROGRAMMING	CO1	Identifying different models and sockets
	CO2	Demonstrate different TCP Echo server functions and I/O models

	CO3	Rationalize IPV4 and IPV6 Socket options
	CO4	Identifying daemon processing and Advanced input and output functions
	CO5	Analyze Broadcasting and multicasting
MEAN STACK DEVELOPMENT	CO1	Build static web pages using HTML 5 elements.
	CO2	Apply JavaScript to embed programming interface for web pages and also to perform Client side validations.
	CO3	Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js.
	CO4	Develop JavaScript applications using typescript and work with document database using MongoDB
	CO5	Utilize Angular JS to design dynamic and responsive web pages.
MACHINE LEARNING USING PYTHON LAB	CO1	Implement procedures for the machine learning algorithms
	CO2	Design and Develop Python programs for various Learning algorithms
	CO3	Apply appropriate data sets to the Machine Learning algorithms
	CO4	Develop Machine Learning algorithms to solve real world problems
COMPILER DESIGN LAB	CO1	Design simple lexical analyzers
	CO2	Determine predictive parsing table for a CFG
	CO3	Apply Lex and Yacc tools
	CO4	Examine LR parser and generating SLR Parsing table
	CO5	Relate Intermediate code generation for subset C language
CRYPTOGRAPHY NETWORK SECURITY LAB	CO1	Apply the knowledge of symmetric cryptography to implement encryption and decryption using Ceaser Cipher, Substitution Cipher, Hill Cipher
	CO2	Demonstrate the different algorithms like DES, Blowfish, and Rijndael, encrypt the text "Hello world" using Blowfish Algorithm.
	CO3	Analyze and implement public key algorithms like RSA, Diffie-Hellman Key Exchange mechanism, the message digest of a text using the SHA-1 algorithm
BIG DATA: SPARK	CO1	Develop Map Reduce Programs to analyze large dataset Using Hadoop and Spark

	CO2	Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components
	CO3	Perform the filter, count, distinct, map, flat Map RDD Operations in Spark.
	CO4	Build Queries using Spark SQL
	CO5	Apply Spark joins on Sample Data Sets
	CO6	Make use of sqoop to import and export data from hadoop to database and vice-versa
MEAN STACK TECHNOLOGIES- MODULE I (HTML 5, JAVASCRIPT, EXPRESS.JS, NODE.JS AND TYPESCRIPT)	CO1	Develop professional web pages of an application using HTML elements like lists, navigations, tables, various form elements, embedded media which includes images, audio, video and CSS Styles.
	CO2	Utilize JavaScript for developing interactive HTML web pages and validate form data.
	CO3	Build a basic web server using Node.js and also working with Node Package Manager
	CO4	Build a web server using Express.js
	CO5	Make use of Typescript to optimize JavaScript code by using the concept of strict type checking.
EMPLOYABILITY SKILLS-II	CO1	Solve various Basic Mathematics problems by following different methods
	CO2	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
	CO3	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
	CO4	Analyze, summarize and present information in quantitative forms including table, graphs and formulas
DATA STRUCTURES AND ALGORITHMS	CO1	Use basic data structures such as arrays and linked list.
	CO2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
	CO3	Use various searching and sorting algorithms.
CLOUD COMPUTING	CO1	Illustrate the key dimensions of the challenge of Cloud Computing
	CO2	Classify the Levels of Virtualization and mechanism of tools
	CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.

	CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
	CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application
NEURAL NETWORKS AND SOFT COMPUTING	CO1	Understand the concepts of Artificial intelligence and soft computing techniques
	CO2	Analyze the concepts of Neural Networks and select the Learning Networks in modeling real world systems
	CO3	Implement the concepts of Fuzzy reasoning and concepts of Genetic algorithm and its applications to soft computing
	CO4	Classify Biologically inspired algorithm such as neural networks, genetic algorithms, ant colony optimization, and bee colony optimization.
	CO5	Design hybrid system incorporating neural network, genetic algorithms, fuzzy systems.

B.tech 7th Sem		
Course Name	Course Outcomes	
AD-HOC AND SENSOR NETWORKS	CO1	Evaluate the principles and characteristics of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
	CO2	Determine the principles and characteristics of wireless sensor networks.
	CO3	Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks.
	CO4	Illustrate the various sensor network Platforms, tools and applications.
	CO5	Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs.
CYBER SECURITY & FORENSICS	CO1	Explain the Cybercrime Fundamentals
	CO2	Describe the types of attacks on networks
	CO3	Analyze various tools available for Cybercrime

		Investigation
	CO4	Explain the Computer Forensics and Investigation Fundamentals and tools
	CO5	Analyze the legal perspectives of Cybercrime
DEEP LEARNING TECHNIQUES	CO1	Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and Deep Learning.
	CO2	Discuss the Neural Network training, various random models.
	CO3	Explain the Techniques of Keras, TensorFlow, Theano and CNTK
	CO4	Classify the Concepts of CNN and RNN
	CO5	Implement Interactive Applications of Deep Learning.
SOCIAL NETWORKS & SEMANTIC WEB	CO1	Demonstrate social network analysis and measures.
	CO2	Analyze random graph models and navigate social networks data
	CO3	Apply the network topology and Visualization tools.
	CO4	Analyze the experiment with small world models and clustering models.
	CO5	Compare the application driven virtual communities from social network Structure.
COMPUTER VISION	CO1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
	CO2	Describe known principles of feature detection and matching,
	CO3	Describe basic methods of computer vision related to image stitching, photography like high dynamic range imaging and blur removal.
	CO4	Suggest a design of a computer vision system for a 3D Reconstruction, Albedos, image based rendering views and depths.
BLOCK-CHAIN TECHNOLOGIES	CO1	Demonstrate the block chain basics, Crypto currency
	CO2	To compare and contrast the use of different private vs. public block chain and use cases
	CO3	Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins
	CO4	Classify Permission Block chain and use cases – Hyper ledger, Corda

	CO5	Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others
WIRELESS NETWORK SECURITY	CO1	Explain the Threats in networks and provide Authentication to real time problems.
	CO2	Identify and investigate in-depth both early and contemporary threats to wireless networks security
	CO3	Ability to analyze and determine for any organization the database security requirements and appropriate solutions
	CO4	Determined IP Security Issues and solve real time problems.
	CO5	Build wireless Development Strategies in real time issues
ETHICAL HACKING	CO1	Explain the concepts related to hacking, ports and protocols, pen testing and virtualization
	CO2	Determine the applicable foot printing techniques and scanning methods
	CO3	Explain the process of system hacking and Explain the concepts Trojans, backdoors, worms and virus and it's countermeasures
	CO4	Demonstrate systematic understanding of the concepts of Sniffing and Social Engineering and it's attacks
	CO5	Determine the applicable methods of cryptography, stenography and Vulnerability Assessment
API AND MICROSERVICES	CO1	Develop a Spring Data JPA application with Spring Boot
	CO2	Implement CRUD operations using Spring Data JPA
	CO3	Implement pagination and sorting mechanism using Spring Data JPA
	CO4	Implement query methods for querying the database using Spring Data JPA
	CO5	Implement a custom repository to customize a querying mechanism using Spring Data JPA
	CO6	Understand update operation using query approaches in Spring Data JPA
	CO7	Implement Spring Transaction using Spring Data JPA
	CO8	Develop RESTful endpoints using Spring REST Processing URI parameters

	CO9	Write RESTful services using Spring REST that consumes and produces data in different formats
	CO10	Handle exceptions and errors in Spring REST endpoints
	CO11	Write Spring based REST clients to consume RESTful services programmatically
	CO12	Create secure RESTful endpoints using Spring Security Document and version the Spring REST endpoints Implement CORS in a Spring REST application
SECURE CODING TECHNIQUES	CO1	Differentiate the objectives of information security
	CO2	Understand the trend, reasons and impact of the recent Cyber attacks
	CO3	Understand OWASP design principles while designing a web application
	CO4	Understand Threat modelling
	CO5	Importance of security in all phases of SDLC
	CO6	Write secure coding using some of the practices in C/C++/Java and Python programming languages
UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMON	CO1	By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. This is only an introductory foundational input. It would be desirable to follow it up by a) faculty-student or mentor-mentee programs throughout their time with the institution b) Higher level courses on human values in every aspect of living. E.g. as a professional
PYTHON: DEEP LEARNING	CO1	Demonstrate the basic concepts fundamental learning techniques and layers.
	CO2	Discuss the Neural Network training, various random models.
	CO3	Apply various optimization algorithms to comprehend different activation
	CO4	functions to understand hyper parameter tuning

	CO5	Build a convolutional neural network, and understand its application to build a
	CO6	recurrent neural network, and understand its usage to comprehend auto encoders to briefly explain transfer learning
MEAN STACK TECHNOLOGIES- MODULE II- ANGULAR JS, MONGODB	CO1	Build a component-based application using Angular components and enhance their functionality using directives
	CO2	Utilize data binding for developing Angular forms and bind them with model data.
	CO3	Apply Angular built-in or custom pipes to format the rendered data.
	CO4	Develop a single page application by using synchronous or asynchronous Angular routing.
	CO5	Make use of MongoDB queries to perform CRUD operations on document database.
Subject: SOFTWARE ENGINEERING	CO1	Ability to transform an Object-Oriented Design into high quality, executable code
	CO2	Skills to design, implement, and execute test cases at the Unit and Integration level
	CO3	Compare conventional and agile software methods
	CO4	Prepare SRS document, design document, test cases and software configuration management and risk management related document.
	CO5	Develop function oriented and object oriented software design using tools like rational rose.
	CO6	Use modern engineering tools necessary for software project management, estimations, time management and software reuse
	CO7	Generate test cases for software testing
COMPUTATIONAL THINKING	CO1	Describe the skills that are involved in computational thinking
	CO2	Demonstrate the concepts of Boolean Logic and Software Development.
	CO3	Analyze the concepts of algorithmic thinking as modeling and abstraction as encapsulation.
	CO4	Illustrate the distinctive nature of data organization, White box and Black box testing
	CO5	Student will be aware of a range of applications of computational thinking in different disciplines, Authentication and authorization.
OBJECT ORIENTED PROGRAMMING	CO1	Evaluate default value of all primitive data type, Operations, Expressions, Control- flow, Strings

THROUGH JAVA	CO2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
	CO3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
	CO4	Construct Threads, Event Handling, implement packages, developing applets
DATA ANALYTICS USING PYTHON	CO1	Understand various file formats in loading and storage of data.
	CO2	Understand NumPy and Pandas
ARTIFICIAL INTELLIGENCE	CO1	Understand the fundamental concepts in Artificial Intelligence
	CO2	Analyze the applications of search strategies and problem reductions
	CO3	Apply the mathematical logic concepts.
	CO4	Develop the Knowledge representations in Artificial Intelligence.
	CO5	Explain the Fuzzy logic systems.
UNIX AND SHELL PROGRAMMING	CO1	Gain good knowledge on Unix commands and awareness of shell programming
	CO2	Know about different system calls for files and directories
	CO3	Ability to know the working of processes and signals
	CO4	Application of client server program for IPC
	CO5	Knowledge about socket programming
CLOUD COMPUTING	CO1	Illustrate the key dimensions of the challenge of Cloud Computing
	CO2	Classify the Levels of Virtualization and mechanism of tools.
	CO3	Analyze Cloud infrastructure including Google Cloud and Amazon Cloud
	CO4	Create Combinatorial Auctions for cloud resource and design scheduling algorithms for computing cloud
	CO5	Assess control storage systems and cloud security, the risks involved its impact and develop cloud application

Course Name	Course Outcomes	
MATHEMATICS FOR MACHINE LEARNING (AI & ML)	CO1	understand the basic notions of machine learning and of the related basic mathematical tools;
	CO2	comprehend the basic concepts and techniques of convex optimization
	CO3	have a good knowledge of the statistical and computational properties of some well known machine learning algorithms;
	CO4	implement machine learning algorithms on synthetic and real data sets using mathematical concepts like linear algebra, probability and calculus
TEXT MINING AND TIME SERIES ANALYSIS (AI & ML)	CO1	Student will be aware of fundamental concepts of text mining, unsupervised information extraction.
	CO2	Student will be aware of text clustering algorithms like feature selection, distance-based clustering and latent semantic indexing.
	CO3	Student will be aware of Text classification algorithm and text mining techniques.
	CO4	Student should aware of all the characteristics of time series and measures of dependencies.
	CO5	Student will be able to understand the ARIMA Models.
NATURAL LANGUAGE PROCESSING (AI & ML)	CO1	Demonstrate a given text with basic Language features
	CO2	To design an innovative application using NLP components
	CO3	Explain a rule based system to tackle morphology/syntax of a language
	CO4	To design a tag set to be used for statistical processing for real-time applications
	CO5	To compare and contrast the use of different statistical approaches for different types of NLP applications.
REINFORCEMENT LEARNING (AI & ML)	CO1	Learn how to define RL problems like Tic-Tac-Toe, Multi-arm.
	CO2	Student will be able to understand the finite markov decision processes.
	CO3	Student will be to Understand Monte Carlo Methods and how it is work with tabular methods to solve classical control problems
	CO4	Student should aware of Eligibility Traces and Understand how to find with approximate solutions.

	CO5	Explore imitation learning tasks and solutions
	CO6	Recognize current advanced techniques and applications in RL
INTERNET OF THINGS (Systems Engineering)	CO1	Explain in a concise manner how the general Internet as well as Internet of Things work.
	CO2	Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
	CO3	Use basic sensing and measurement and tools to determine the real-time performance of network of devices.
	CO4	Develop prototype models for various applications using IoT technology.
DATA COMMUNICATIONS AND INFORMATION CODING THEORY	CO1	Understand and explain the basic concepts of information theory, source coding, channel and channel capacity, channel coding and relation among them.
	CO2	Describe the real life applications based on the fundamental theory.
	CO3	Calculate entropy, channel capacity, bit error rate, code rate, steady-state probability and so on
	CO4	Implement the encoder and decoder of one block code or convolutional code using any program language
SERVICE ORIENTED ARCHITECTURES	CO1	Get the foundations and concepts of service based computing
	CO2	Advocate the importance and means of technology alignment with business
	CO3	Understanding the basic operational model of web services,
	CO4	Gain the knowledge of key technologies in the service oriented computing arena
	CO5	Apply and practice the learning through a real or illustrative project/case study.
DESIGN OF SECURE PROTOCOLS	CO1	Get the exposure to various protocols.
	CO2	Gain knowledge on various secure mechanisms through set of protocols.
	CO3	Efficiently design new set of protocols
	CO4	Learn Security issues and overcome means with protocols.
NETWORK CODING (Systems Engineering)	CO1	Explain the client-server paradigm and socket structures.
	CO2	Describe the basic concepts of TCP sockets and

		TCP echo client-server programs.
	CO3	Discuss the UDP sockets and UDP echo client-server programs
	CO4	Explain Socket options and ability to understand IPC
	CO5	Apply the applications of sockets and demonstrate skill to design simple applications like FTP, TELNET etc.
PRINCIPLES OF CYBER SECURITY (Information Security)	CO1	Apply cyber security architecture principles
	CO2	Demonstrate the risk management processes and practices.
	CO3	Appraise cyber security incidents to apply appropriate response
	CO4	Distinguish system and application security threats and vulnerabilities.
	CO5	Identify security tools and hardening techniques
COMPUTATIONAL NUMBER THEORY	CO1	understand with basics of number theory and its applications.
	CO2	demonstrate the arithmetic of finite fields, polynomials.
	CO3	analyze the elliptic curves, testing and factorization.
	CO4	Student will be able to solve the discrete logarithms and large sparse linear systems.
	CO5	Student will be able to apply the skills for writing programs of cryptography algorithms.
CRYPTANALYSIS (Information Security)	CO1	Understand the cryptanalysis of classic ciphers, stream ciphers and block ciphers
	CO2	Understand the cryptanalysis of public key attacks
ELLIPTIC CURVE CRYPTOGRAPHY	CO1	Understands Finite Field Arithmetic and Elliptic Curve Arithmetic
	CO2	Survey the attacks and validates the domain parameters and keypairs.
INTRODUCTION TO QUANTUM COMPUTING AND QUANTUM CRYPTOGRAPHY	CO1	Analyze complex vector space for quantum computing
	CO2	Understand QKD algorithms
PUBLIC KEY INFRASTRUCTURE AND TRUST MANAGEMENT	CO1	In depth understanding of Public key cryptography and Infrastructure.
	CO2	Ability to design and analyze Public Key cryptographic techniques.
	CO3	Ability to solve network security issues in real

		time applications.
	CO4	Ability to take up doctoral level research work in security.
INFORMATION SECURITY ANALYSIS AND AUDIT	CO1	Illustrate the fundamental concepts of information security and systems auditing
	CO2	Analyze the latest trend of computer security threats and defense
	CO3	Identify security weaknesses in information systems, and rectify them with appropriate security mechanisms
	CO4	Explain the security controls in the aspects of physical, logical and operational security control and case studies
	CO5	Evaluate the security of information systems
CLOUD AND IOT SECURITY	CO1	Discuss about Security Requirements in IoT Architecture
	CO2	Explain Random number generation
	CO3	Demonstrate Authorization with Publish / Subscribe schemes
	CO4	Identify Lightweight and robust schemes for Privacy protection
	CO5	Explain about IoT cloud security architecture
WEB SECURITY	CO1	Demonstrate security concepts, security professional roles, and security resources in the context of systems and security development life cycle
	CO2	Justify applicable laws, legal issues and ethical issues regarding computer crime
	CO3	Explain the business need for security, threats, attacks, top ten security vulnerabilities, and secure software development
	CO4	Apply information security policies, standards and practices, the information security blueprint
	CO5	Analyze and describe security requirements for typical web application scenario
BLOCK CHAIN ARCHITECTURE DESIGN AND USE CASES	CO1	Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding
	CO2	Identify the risks involved in building Block chain applications.
	CO3	Review of legal implications using smart contracts.

	CO4	Choose the present landscape of Block chain implementations and Understand Crypto currency markets
	CO5	Examine how to profit from trading crypto currencies.
DATA VISUALIZATION	CO1	Identify and recognize visual perception and representation of data.
	CO2	Illustrate about projections of different views of objects.
	CO3	Apply various Interaction and visualization techniques.
	CO4	Analyze various groups for visualization
	CO5	Evaluate visualizations
STATISTICAL FOUNDATIONS FOR DATA SCIENCE	CO1	Use the statistical concepts in the field of data science.
	CO2	Employ the techniques and methods related to the area of data science in variety of applications.
	CO3	Apply logical thinking to understand and solve the problem in context.
	CO4	Explore statistical learning methods and their application to modern problems in science, industry, and society
	CO5	Build analytics pipelines for regression problems and classification problems
MINING MASSIVE DATA SETS	CO1	Discuss research directions in Mining Massive Datasets, such as similarity search, streaming data, clustering, and graph mining.
	CO2	Analyze policy, focusing on methods for mining massive datasets and potential policy and management applications, by synthesizing and summarizing the current state of the art, and facilitating discussion by posing questions, preliminary conclusions, and ideas to explore.
	CO3	Develop a research project relevant to Mining Massive Datasets and produce a report describing the project's background, methods, results, and conclusions.
	CO4	Knowledge of basic computer science principles and skills, at a level sufficient to write a reasonably non-trivial computer program.
	CO5	Good knowledge of Java and Python will be extremely helpful since most assignments will require the use of Spark
MEDICAL IMAGE DATA	CO1	Student will be able to explain the basic concepts

PROCESSING		of Medical Imaging Technologies, Systems and Formation Principles.
	CO2	Student will be able to analyze the Medical Image Storage and Processing.
	CO3	Student will be able to visualize the MRI, NMR and Artifacts.
	CO4	Student should expertise the Segmentation and Classification techniques on Medical Image Data.
	CO5	Student will be able to analyze the Nuclear Imaging like PET, SPECT and 3D Images.

DEPARTMENT OF ECE Courses Outcomes(R20)

ECE Courses Outcomes

B.Tech1 st Sem		
Course Name	Course Outcomes	
COMMUNICATIVE ENGLISH	CO1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information .
	CO2	ask and answer general questions on familiar topics and introduce oneself/others
	CO3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
	CO4	. recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
	CO5	form sentences using proper grammatical structures and correct word forms.SSS
MATHEMATICS-I	CO1	Utilize mean value theorems to real life problems (L3)
	CO2	Solve the differential equations related to various engineering fields (L3)
	CO3	Familiarize with functions of several variables which is useful in optimization
	CO4	Apply double integration techniques in evaluating areas bounded by region
	CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5)
APPLIED CHEMISTRY	CO1	synthesize nanomaterials for modern advances of engineering technology.
	CO2	Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
PROGRAMMING FOR PROBLEM SOLVING USING C	CO1	To write algorithms and to draw flowcharts for solving problems .
	CO2	To apply File/Operation's.

	CO3	To convert flowcharts/algorithms to C Programs, compile and debug programs
	CO4	To use different operators, data types and write programs that use two-way/ multi- way selection
	CO5	To select the best loop construct for a given problem
ENGINEERING DRAWING	CO6	To design and implement programs to analyze the different pointer applications
	CO1	The student will learn how to visualize 2D & 3D objects.
APPLIED CHEMISTRY LAB	CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
PROGRAMMING FOR PROBLEM SOLVING USING C		
PROGRAMMING FOR PROBLEM SOLVING USING C	CO1	Gains Knowledge on various concepts of a language debug program
	CO2	Able to draw flowcharts and write algorithms.
	CO3	Able design and development of C problems solving skills.
	CO4	Able to design and develop modular programming skills
	CO5	Able to trace and debug program

B.Tech2ndSem		
Course Name	Course Outcomes	
MATHEMATICS-II	CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
	CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel
	CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms (L5)
	CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
	CO5	apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3)
	CO6	apply numerical integral techniques to different Engineering problems (L3)
APPLIED PHYSICS	CO1	plain the need of coherent sources and the conditions for sustained interference(L2) → Identify engineering applications of interference(L3) → Analyze the differences between interference and diffraction with applications(L4) → Illustrate the concept of polarization of light and its applications(L2) → Classify ordinary polarized light and extraordinary polarized light(L2)
	CO2	understand the basic concepts of LASER light Sources(L2) → Apply the concepts to learn the types of lasers(L3) → Identifies the Engineering applications of lasers(L2) → Explain the working principle of optical fibers(L2) → Classify optical fibers based on refractive index profile and mode of propagation(L2) → Identify the applications of optical fibers in various fields(L2)
	CO3	Explain the concept of dual nature of matter(L2) → Understand the significance of wave function(L2) → Interpret the concepts of classical and quantum free electron theories(L2) → Explain the importance of K-P model → Classify the materials based on band theory(L2) → Apply the concept of effective mass of electron(L3)
	CO4	Explain the concept of dielectric constant and polarization in dielectric materials(L2) → Summarize various types of polarization of

		dielectrics(L2) → Interpret Lorentz field and Clausius-Mostinski relation in dielectrics(L2) → Classify the magnetic materials based on susceptibility and their temperature dependence (L2) → Explain the applications of dielectric and magnetic materials(L2) → Apply the concept of magnetism to magnetic data storage devices(L3)
	CO5	classify the energy bands of semiconductors(L2) → Interpret the direct and indirect band gap semiconductors(L2) → Identify the type of semiconductor using Hall effect(L2) → Identify applications of semiconductors in electronic devices(L2) → Classify superconductors based on Meissner's effect(L2) → Explain Meissner's effect, BCS theory & Josephson effect in superconductors(L2)
OBJECT ORIENTED PROGRAMMING THROUGH JAVA	CO1	Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard.
	CO2	Illustrate the basic principles of the object-oriented programming
	CO3	Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.
NETWORK ANALYSIS	CO1	gain the knowledge on basic network elements. will analyze the RLC circuits behavior in detailed. analyze the performance of periodic waveforms. gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h&g). analyze the filter design concepts in real world applications.
	CO2	will analyze the RLC circuits behavior in detailed
	CO3	analyze the performance of periodic waveforms
	CO4	gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h&g)
	CO5	analyze the filter design concepts in real world applications.
BASIC ELECTRICAL ENGINEERING	CO1	Able to explain the operation of DC generator and analyze the characteristics of DC generator.
	CO2	Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DC motors

	CO3	Ability to analyze the performance and speed – torque characteristics of a3- phase induction motor and understand starting methods of 3- phase induction motor
	CO4	Able to explain the operation of Synchronous Machines
	CO5	Capability to understand the operation of various special machines
BASIC ELECTRICAL ENGINEERING LAB	CO1	Determine and predetermine the performance of DC machine sand transformers.
	CO2	Control the DC shunt machines.
	CO3	Compute the performance of 1-phase transformer
	CO4	Perform tests on 3-phase induction motor and alternator to determine their performance characteristics.

ENVIRONMENTAL SCIENCE	CO1	The student will learn how to visualize 2D & 3D objects.

B.Tech3rdSem		
Course Name	Course Outcomes	
ELECTRONIC DEVICES AND CIRCUITSSS	CO1	Applythebasicconceptsof semiconductor physics. Understandthe formationofp-n
	CO2	. Understandthe formationofp-injunctionhowitcanbeuse asap
	CO3	injunctions diodeindifferentmodes of operation.
	CO4	Knowtheconstruction,workingprincipleofrectifierswith andwithoutfilterswi relevant expressions and necessary comparisons.
	CO5	Understandtheconstruction,principleofoperationoftran

		sistors,BJTandFETwiththe irV- Icharacteristicsindifferentconfigurations
SWITCHING THEORYAND LOGIC D	CO6	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
	CO7	Performtheanalysisofsmallsignalowfrequencytransist oramplifiercircuitsusingBJ Tand FET indifferent configurations Design of encoder, decoder ,multiplex eranddemultip
	CO1	.Classify different number systems and apply to generatevariouscodes..
	CO2	Use the concept of Boolean algebra in minimization ofswitchingfunctions
	CO3	Design different types of combinationallogiccircuits
	CO4	Apply knowledge of flip-flops in designing of Registersandcounters
	CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
RANDOM VARIABLES AND STOCHASTIC PROCESSES	CO1	Mathematically model her and Om phenomena and solve simple probabilistic problems.
	CO2	Identify different types of random variables and compute statistical averages of the Sarandon variables.
	CO3	Analyze the LTI systems with random inputs.
SIGNALS AND SYSTEMS	CO1	. Differentiate the various classifications of signals and systems
	CO2	Analyze the frequency domain representation of signals using Fourier concepts
	CO3	Classify the systems based on their properties and determine the response of LTISystems. . Know the sampling process and various types of sampling techniques
	CO4	Apply Laplace and z-transforms to analyze signals and Systems (continuous discrete).
	CO5	
	CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)

MATHEMATICS-III	CO2	Estimate the work done against a field, circulation and flux using vector calculus (L5)
	CO3	Apply the Laplace transform for solving differential equations (L3)
	CO4	Kneadable to apply integral expressions for the forwards and inverse Fourier transform to arrange of non-periodic wave forms (L3)
	CO5	Identify solution methods for partial differential equations that model physical processes (L3).

PYTHON LAB (SKILL ORIENTED COURSE)	CO1	CO1: Know comprehensions, generators in python.
	CO2	Know exception handling inpython
	CO3	Know file I/O
	CO4	Understand various data types like lists, tuples, strings
	CO5	Know the usage of various pre-defined functions on the above data types

B.Tech4thSem		
Course Name	Course Outcomes	
ELECTRONIC CIRCUIT ANALYSIS	CO1	Design and analysis ofsmall signal high frequency transistor amplifier using BJT and FET.
	CO2	Design and analysis of multistage amplifiers using BJT and FET and Differential amplifier using BJT
	CO3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
	CO4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison
	CO5	
DIGITAL IC DESIGN	CO1	Understand the structure of commercially available digital integrated circuit families.
	CO2	Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
	CO3	Model complex digital systems at several levels of abstractions, behavioral, structural, and rapid system prototyping.
	CO4	Analyze and design basic digital circuits with

		combinatorial and sequential logic circuits using VHDL.
	CO5	
ANALOG COMMUNICATIONS	CO1	Differentiate various Analog modulation and demodulation schemes and their spectral characteristics .
	CO2	Analyze noise characteristics of various analog modulation methods
	CO3	Analyze various functional blocks of radiotransmitters and receivers
	CO4	Design simple analog systems for various modulation techniques.
LINEAR CONTROL SYSTEMS	CO1	This course introduces the concepts of feedback and its advantages to various control systems
	CO2	The performance metrics to design the control system intime-domain and frequency domain are introduced.
	CO3	Controlsystems for various applications can be designed using time-domain and frequency domain analysis
	CO4	In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
MANAGEMENT AND ORGANISATIONAL BEHAVIOUR	CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure.
	CO2	Will familiarize with the concepts of functional management that is HR Mand Marketing of new product developments.
	CO3	The learner sable to think in strategically through contemporary management practices.
	CO4	The learner can develop positive attitude through personality development and can equip with motivational theories.
	CO5	. The student can attain the group performance and grievance handling in managing the organizational culture.
SOFT SKILLS (SKILL ORIENTED COURSE)	CO1	At the end of the Course, the Student will be able to: CO1 Use language fluently, accurately and appropriately in debates and group discussions CO2 Use their skills of listening comprehension to communicate effectively in cross-cultural contexts. CO3 Learn and use new vocabulary. CO 4 Write

		resumes, project reports and reviews. CO5 Exhibit interview skills and develop soft skills.
	CO2	1. Group Discussion–dynamics of group discussion, Lateral thinking, Brain storming.
	CO3	Interview Skills– concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
	CO4	Meetings-making meeting effective, chairing a meeting, decision making, seeking opinions, interrupting and handling interruptions, clarifications, closure, Negotiation skills.
	CO5	Listening comprehension – Achieving ability to comprehend material delivered at relatively fastspeed; comprehending spoken material in Standard Indian English, British English, and American English.
	CO6	Cross-Cultural Communication / Non-Verbal Communication, Problems of Language, Lack of Language equivalency/ difficulties in using English.
	CO7	Vocabulary building, Creativity in using Advertisements, Case Studies etc.
	CO8	Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking.
	CO9	Resume writing –structure and presentation, planning, defining the career objective
	CO10	Writing Skills–Letter writing, Email etiquette; Essays for competitive examinations, Analyzing news paper articles. 1 Technical Report Writing/Project Proposals–Types of format

B.Tech5thSem		
Course Name	Course Outcomes	
ANALOG ICS AND APPLICATIONS	CO1	Describe the Op-Amp and internal Circuitry: 555 Timer, PLL .
	CO2	Discuss the Applications of Operational amplifier: 555 Timer, PLL
	CO3	Design the Active filters using Operational Amplified
	CO4	Use the Op-Amp in A to D & D to A Converters
	CO5	
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES	CO1	Determine E and H using various laws and applications of electric & magnetic fields .
	CO2	Apply the Maxwell equations to analyze the time varying behavior of EM waves.

	CO3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media.
	CO4	Calculate Brewster angle, critical angle and total internal reflection
	CO5	Derive and Calculate the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc. using smith chart.
DIGITAL COMMUNICATIONS	CO1	Analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system.
	CO2	Analyze various source coding techniques.
	CO3	. Compute and analyze Block codes, cyclic codes and convolution codes
	CO4	Design a coded communication system.
ANTENNA AND WAVE PROPAGATION (PE1)	CO1	Identify basic antenna parameters.
	CO2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro-strip antennas
	CO3	Quantify the fields radiated by various types of antennas
	CO4	Design and analyze antenna arrays
	CO5	. Analyze antenna measurements to assess antenna's performance
	CO6	Identify the characteristics of radio wave propagation
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	CO1	Select the instrument to be used based on the requirements.
	CO2	Understand and analyze different signal generators and analyzers.
	CO3	. Understand the design of oscilloscopes for different applications.
	CO4	Design different transducers for measurement of different parameters

COMPUTER ARCHITECTURE &	CO1	Students can understand the architecture of modern computer.
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ORGANIZATION	CO2	They can analyze the Performance of a computer using performance equation
	CO3	Understanding of different instruction types.
	CO4	. Students can calculate the effective address of an operand by addressing modes
	CO5	They can understand how computer stores positive and negative numbers
	CO6	Understand the concepts of I/O Organization and Memory systems.

B.Tech6thSem		
Course Name	Course Outcomes	
MICROPROCESSOR AND MICROCONTROLLERSS	CO1	Understand the architecture of microprocessor/ microcontroller and their operation.
	CO2	Demonstrate programming skills in assembly language for processors and Controllers.
	CO3	Analyze various interfacing techniques and apply them for the design of processor / Controller based systems.
VLSI DESIGN	CO1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling. 2. Apply the design Rules and draw layout of a given logic circuit. 3. Design basic building blocks in Analog IC design. 4. Analyze the behavior of amplifier circuits with various loads. 5. Design various CMOS logic circuits for design of Combinational logic circuits. 6. Design MOSFET based logic circuits using various logic styles like static and dynamic CMOS. 7. Design various applications using FPGA.
	CO2	. Apply the design Rules and draw layout of a given logic circuit

	CO3	Design basic building blocks in Analog IC design
	CO4	Analyze the behavior of amplifier circuits with various loads.
	CO5	. Design various CMOS logic circuits for design of Combinational logic circuits
	CO6	Design MOSFET based logic circuits using various logic styles like static and dynamic CMOS.
	CO7	Design various applications using FPGA.
DIGITAL SIGNAL PROCESSING	CO1	Apply the difference equations concept in the analysis of Discrete time systems .
	CO2	Use the FFT algorithm for solving the DFT of a given signal.
	CO3	. Design a Digital filter (FIR&IIR) from the given specifications.
	CO4	. Realize the FIR and IIR structures from the designed digital filter.
	CO5	Use the Multirate Processing concepts in various applications (eg: Design of phase shifters, Interfacing of digital systems.
	CO6	Apply the signal processing concepts on DSP Processor.
MICROWAVE ENGINEERING	CO1	Design different modes in waveguide structures .
	CO2	Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction.
	CO3	Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices.
	CO4	. Measure various microwave parameters using a Microwave test bench
MOBILE & CELLULAR COMMUNICATION	CO1	Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
	CO2	Understand the frequency management, channel assignment strategies and antennas in cellular systems
	CO3	Understand the frequency management, channel assignment strategies and antennas in cellular systems
EMBEDDED SYSTEMS	CO1	. Understand the basic concepts of an embedded

		system and able to know an embedded system design approach to perform a specific function.
	CO2	The hardware components required for an embedded system and the design approach of an embedded hardware.
	CO3	The various embedded firmware design approaches on embedded environment.
	CO4	. Understand how to integrate hardware and firmware of an embedded system using real time operating system.
CMOS ANALOG IC DESIGN	CO1	Design MOSFET based analog integrated circuits.
	CO2	Analyze analog circuits at least to the first order
	CO3	Appreciate the trade-offs involved in analog integrated circuit design.
	CO4	. Understand and appreciate the importance of noise and distortion in analog circuits
	CO5	Analyze complex engineering problems critically in the domain of analog IC design for conducting research
ARM BASED/ AURDINO BASED PROGRAMMING	CO1	Comprehend Microcontroller-Transducers Interface techniques .
	CO2	Establish Serial Communication link with Arduino
	CO3	Analyze basics of SPI interface
	CO4	Interface Stepper Motor with Arduino
	CO5	Analyze Accelerometer interface techniques

B.Tech7thSem		
Course Name	Course Outcomes	
OPTICAL COMMUNICATIONS	CO1	Choose necessary components required in modern optical communications systems .
	CO2	. Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
	CO3	Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.

	CO4	Choose the optical cables for better communication with minimum losses
	CO5	Design, build, and demonstrate optical fiber experiments in the laboratory.
DIGITAL IMAGE PROCESSING	CO1	Perform image manipulations and different digital image processing techniques .
	CO2	Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image
	CO3	transforms and restoration techniques on image. 3. Analyze pseudo and full color image processing techniques.
	CO4	Apply various morphological operators on images.
LOW POWER VLSI DESIGN	CO1	Capability to recognize advanced issues in VLSI systems, specific to the deep-submicron silicon Technologies..
	CO2	. Students able to understand deep submicron CMOS technology and digital CMOS design styles.
	CO3	To design chips used for battery-powered systems and high performance circuits.
	CO4	Learn the design of various CMOS dynamic logic circuits.
	CO5	Learn the design techniques low voltage and low power CMOS circuits for various applications.
	CO6	Learn the different types of memory circuits and their design.
SATELLITE COMMUNICATION	CO1	Understand the concepts, applications and subsystems of Satellite communications.
	CO2	Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
	CO3	Understand the various types of multiple access techniques and architecture of earth station design.
	CO4	Understand the concepts of GPS and its architecture.
SOFT COMPUTING TECHNIQUES	CO1	Develop intelligent systems leveraging the paradigm of soft computing techniques.
	CO2	Implement, evaluate and compare solutions by various soft computing approaches for finding the optimal solutions.
	CO3	. Recognize the feasibility of applying a soft

		computing methodology for a particular problem
	CO4	Design the methodology to solve optimization problems using fuzzy logic, genetic algorithms and neural networks
	CO5	Design hybrid system to revise the principles of soft computing in various application
DIGITAL IC DESIGN USING CMOS	CO1	Understand the concepts of MOS Design..
	CO2	Design and analysis of Combinational and Sequential MOS Circuits.
	CO3	Extend the Digital IC Design to Different Applications.
	CO4	. Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.
RADAR ENGINEERING	CO1	Derive the radar range equation and to solve some analytical problems. the various components of radar receiver and its performance.
	CO2	Understand the different types of radars and its applications.
	CO3	Understand the concept of tracking and different tracking techniques
	CO4	Understand the various components of radar receiver and its performance.
PATTERN RECOGNITION & MACHINE LEARNING	CO1	Study the parametric and linear models for classification
	CO2	Design neural network and SVM for classification.
	CO3	Develop machine independent and unsupervised learning techniques.
INTERNET OF THINGS	CO1	Understand internet of Things and its hardware and software components.
	CO2	Interface I/O devices, sensors & communication modules.
	CO3	Remotely monitor data and control devices.
	CO4	Design real time IoT based applications
BASICS OF SIGNALS AND SYSTEMS	CO1	. Understand linear time invariant systems.
	CO2	Apply the concepts of Fourier series

		representations to analyze continuous and discrete time periodic signals.
	CO3	. Understand and apply the continuous time Fourier transform, discrete time Fourier transform
	CO4	Apply the concepts of Laplace transform, and z-Transform to the analysis and description of LTI continuous and discrete-time systems
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION	CO1	. Select the instrument to be used based on the requirements.
	CO2	. Understand and analyze different signal generators and analyzers
	CO3	Understand the design of oscilloscopes for different applications.
	CO4	Design different transducers for measurement of different parameters.
PRINCIPLES OF SIGNAL PROCESSING	CO1	Use the FFT algorithm for solving the DFT of a given signal .
	CO2	Design a Digital filter (FIR&IIR) from the given specifications.
	CO3	Realize the FIR and IIR structures from the designed digital filter.
	CO4	Use the Multirate Processing concepts in various applications.
	CO5	Apply the Adaptive signal processing concepts to various signal processing applications.
INDUSTRIAL ELECTRONICS	CO1	. Understand the concept of DC amplifiers.
	CO2	Analyze and design different voltage regulators for real time applications.
	CO3	Describe the basis of SCR and Thyristor.
	CO4	Determine the performance of DIAC and TRIAC .
	CO5	Develop real time application using electronics.
CONSUMER ELECTRONICS	CO1	Understand the various type of microphones and loud speakers.
	CO2	. To identify the various digital and analog signal.
	CO3	. Describe the basis of television and composite video signal.
	CO4	. Describe the various kind of color TV standards and system.
	CO5	. Understand the various type of consumer goods.

FUNDAMENTALS OF MICROPROCESSORS AND MICROCONTROLLERS	CO1	. Understand the architecture of microprocessor/microcontroller and their operation.
	CO2	Demonstrate programming skills in assembly language for processors and controllers.
	CO3	. Analyze various interfacing techniques and apply them for the design of processor/Controller based systems.
		.
TRANSDUCERS AND SENSORS	CO1	. Use concepts in common methods for converting a physical parameter into an electrical quantity
	CO2	Classify and explain with examples of transducers, including those for measurement of temperature, strain, motion, position and light.
	CO3	Choose proper sensor comparing different standards and guidelines to make sensitive measurements of physical parameters like pressure, flow, acceleration, etc..
	CO4	. Predict correctly the expected performance of various sensors.
	CO5	Locate different type of sensors used in real life applications and paraphrase their importance.
	CO6	Set up testing strategies to evaluate performance characteristics of different types of sensors and transducers.
	CO7	develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system.
IOT AND APPLICATIONS	CO1	Understand internet of Things and its hardware and software components.
	CO2	. Interface I/O devices, sensors & communication modules.
	CO3	Remotely monitor data and control devices.
	CO4	. Design real time IoT based applications
SOFT COMPUTING TECHNIQUES	CO1	Develop intelligent systems leveraging the paradigm of soft computing techniques.
	CO2	Implement, evaluate and compare solutions by various soft computing approaches for finding the optimal solutions.
	CO3	. Recognize the feasibility of applying a soft

		computing methodology for a particular problem.
	CO4	. Design the methodology to solve optimization problems using fuzzy logic, genetic algorithms and neural networks.
	CO5	Design hybrid system to revise the principles of soft computing in various application.
IC APPLICATIONS	CO1	Analyze the Differential Amplifier with Discrete components
	CO2	Describe the Op-Amp and internal Circuitry: .555 Timer, PLL.
	CO3	Discuss the Applications of Operational amplifier: 555 Timer, PLL.
	CO4	Design the digital application using digital ICs.
	CO5	Use the Op-Amp in A to D & D to A Converters.
PRINCIPLES OF COMMUNICATIONS	CO1	. Analyze the performance of analog modulation schemes in time and frequency domains.
	CO2	. Analyze the performance of angle modulated signals.
	CO3	Characterize analog signals in time domain as random processes and noise.
	CO4	Determine the performance of analog communication systems in terms of SNR.
	CO5	Analyze pulse amplitude modulation, pulse position modulation, pulse code modulation and TDM systems.
BASIC ELECTRONICS	CO1	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
	CO2	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
	CO3	. Understand the construction, principle of operation of transistors.
DATA COMMUNICATIONS	CO1	. Know the Categories and functions of various Data communication .
	CO2	Design and analyze various error detection techniques.
	CO3	Demonstrate the mechanism of routing the data in network layer.
	CO4	Know the significance of various Flow control and

		Congestion control Mechanisms.
DIGITAL LOGIC DESIGN	CO1	Classify different number systems and apply to generate various codes.
	CO2	Use the concept of Boolean algebra in minimization of switching functions.
	CO3	Design different types of combination logic circuits.
	CO4	Apply knowledge of flip-flops in designing of Registers and counters.
	CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
	CO6	. Produce innovative designs by modifying the traditional design techniques.
REMOTE SENSING AND GIS	CO1	. Retrieve the information content of remotely sensed data .
	CO2	. Analyze the energy interactions in the atmosphere and earth surface features.
	CO3	Interpret the images for preparation of thematic maps.
	CO4	Apply problem specific remote sensing data for engineering applications.
	CO5	Analyze spatial and attribute data for solving spatial problems.
	CO6	Create GIS and cartographic outputs for presentation.
B.Tech 8th Sem		
BIO MEDICAL INSTRUMENTATION	CO1	Apply principles and concepts of electronics to analyze input and output signals in medical electronics 2
	CO2	Apply principles and concepts of electronics to design filters for de-noising of medical measurements.
	CO3	Recognize different types of transducers, ongoing progress in improving their design, and their application in medical measurements.
	CO4	Apply principles and concepts of sensing and engineering to (i) design diagnostic devices for detection of markers in biofluids, and (ii) be able to evaluate quality of diagnostic devices.
	CO5	Apply engineering tools to evaluate parameters needed for point-of-care health screening and mobile-health, and design of appropriate point-of-

		care diagnostic devices.
Data Acquisition Systems	CO1	1. Be able to identify a data acquisition system.
	CO2	Be able to prescribe a sensor type to measure a specific environmental change.
	CO3	. Be able to determine what type of amplifier is needed for a specific sensor output.
	CO4	. Be familiar with different forms of signal conditioning.
	CO5	Be familiar with different methods of Analog-to-Digital conversion.
	CO6	Be able to identify the type of interface used to get a digital signal into a microprocessor.
ADAPTIVE CONTROL SYSTEMS	CO1	Design identifiers and adaptive controllers for linear systems .
	CO2	. Design Adaptive feedback linearizing control systems for nonlinear systems.
	CO3	: Apply the concept of different types of optimal control for solving problems.
	CO4	Apply the concept of calculus of variation and principal of optimality for solving problems
	CO5	Apply the concept of Linear Quadratic method for solving problems CO.
	CO6	Apply the concept of adaptive control technique for solving problems.
BIO-MEDICAL INSTRUMENTATION	CO1	Apply principles and concepts of electronics to analyze input and output signals in medical electronics
	CO2	. . Apply principles and concepts of electronics to design filters for de-noising of medical measurements.
	CO3	. Recognize different types of transducers, ongoing progress in improving their design, and their application in medical measurements.
	CO4	. Apply principles and concepts of engineering to quantify and model measurements of bio potentials.
	CO5	Apply principles and concepts of sensing and engineering to (i) design diagnostic devices for detection of markers in bio fluids, and (ii) be able to evaluate quality of diagnostic devices.
	CO6	. Apply engineering tools to evaluate parameters needed for point-of-care health screening and mobile-health, and design of appropriate point-of-

		care diagnostic devices.
DIGITAL CONTROL SYSTEMS	CO1	1. Design a pure, two-pole system that satisfies specified performance specifications like percent overshoot, peak time, settling time, and DC gain.
	CO2	Calculate the z-plane location of a pair of dominant poles given time-domain performance information like percent overshoot, settling time, and peak time.
	CO3	Create discrete equivalents from given continuous-time systems.
	CO4	. Able to Construct a discrete-time difference equation containing input variables and output variables at particular time instances from a system's discrete-time transfer function.
	CO5	Numerically compute the value of any system variable (e.g., state variable or output variable) at any discrete, time instant given initial conditions and input waveforms.
PROCESS CONTROL INSTRUMENTATION	CO1	Understand the popular process automation technologies.
	CO2	Design and development of different PLC programming for simple process applications.
	CO3	Understand the different security design approaches, Engineering and operator interface issues for designing Distributed control system.
	CO4	Know the latest communication technologies like HART and Field bus protocol. Mapping of Course Outcome with Programme Outcomes:
TRANSDUCERS AND SENSORS	CO1	Use concepts in common methods for converting a physical parameter into an electrical quantity.
	CO2	Classify and explain with examples of transducers, including those for measurement of temperature, strain, motion, position and light.
	CO3	Choose proper sensor comparing different standards and guidelines to make sensitive measurements of physical parameters like pressure, flow, acceleration, etc..
	CO4	. Predict correctly the expected performance of various sensors.
	CO5	. Locate different type of sensors used in real life applications and paraphrase their importance.
	CO6	Set up testing strategies to evaluate performance

		characteristics of different types of sensors and transducers.
	CO7	develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system.
MEMS	CO1	Understand the basic overview of MEMS and Microsystems with broad category of MEMS& Micro system applications.
	CO2	Understanding the working principles of Microsystems.
	CO3	Understand the Scaling Laws in Miniaturization and Materials for MEMS and Microsystems.
	CO4	Understand the Micro system Fabrication Process and Analyze the different Micro manufacturing process and Applications.
	CO5	Study and Analyze the different types of RF switches, Various Switching Mechanism and their applications.
Intelligent and Smart Instrumentation	CO1	To develop the design methodologies for measurement and instrumentation of real world problems.
	CO2	To be study the concepts of intelligent sensor devices, their performance characteristics and signal and system dynamics.
	CO3	To address the issues in dealing signal conditioning operations such as calibration, linearization and compensation.
	CO4	To use artificial intelligence in sensor signal processing to solve real world problems.
	CO5	To deal with interfacing protocols in wireless networking platform.
VLSI TECHNOLOGY AND DESIGN	CO1	. Understand the basics of MOS transistors and also the characteristics of MOS transistors.
	CO2	. Learn about the MOS fabrication process and short channel effects.
	CO3	Learn about the basic rules in layout designing.
	CO4	Analyze various combinational logic networks and sequential systems.

CMOS ANALOG IC DESIGN	CO1	Design MOSFET based analog integrated circuits.
	CO2	Analyze analog circuits at least to the first order.
	CO3	Appreciate the trade-offs involved in analog integrated circuit design.
	CO4	Understand and appreciate the importance of noise and distortion in analog circuits.
CMOS DIGITAL IC DESIGN	CO1	Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS, Alternative CMOS Logics, Estimation of Delay and Power, Adders Design.
	CO2	Classify different semiconductor memories.
	CO3	. . Analyze, design and implement combinational and sequential MOS logic circuits.
	CO4	Solve engineering problems for feasible and optimal solutions in the core area of digital ICs.
DESIGN OF TESTABILITY	CO1	. apply the concepts in testing which can help them design a better yield in IC design.
	CO2	. . tackle the problems associated with testing of semiconductor circuits at earlier design levels so as to significantly reduce the testing costs.
	CO3	. analyses the various test generation methods for static & dynamic CMOS circuits.
	CO4	identify the design for testability methods for combinational & sequential CMOS circuits.
	CO5	recognize the BIST techniques for improving testability.
	CO1	. apply the concepts in testing which can help them design a better yield in IC design.
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	CO5	recognize the BIST techniques for improving testability.

DEPARTMENT OF EEE Course Outcomes (R20)

I YEAR SEMESTER-I

Course Code	Course Name	Course Outcomes	
R201102	COMMUNICATIVE ENGLISH	CO1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
		CO2	ask and answer general questions on familiar topics and introduce oneself/others
		CO3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
		CO4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
		CO5	form sentences using proper grammatical structures and correct word forms
R201101	MATHEMATICS-I	CO1	utilize mean value theorems to real life problems (L3)
		CO2	solve the differential equations related to various engineering fields (L3)
		CO3	familiarize with functions of several variables which is useful in optimization (L3)
		CO4	apply double integration techniques in evaluating areas bounded by region (L3)
		CO5	students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional and 3-dimensional coordinate systems (L5)

R201109	MATHEMATICS-II (Linear Algebra and Numerical Methods)	CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
		CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
		CO3	evaluate the approximate roots of polynomial and transcendental equations by different algorithms (L5)
		CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
		CO5	apply numerical integral techniques to different Engineering problems (L3)

R201110	PROGRAMMING FOR PROBLEM SOLVING USING C	CO1	1.To write algorithms and to draw flowcharts for solving problems 2.To convert flowcharts/algorithms to C Programs, compile and debug programs
		CO2	1.To use different operators, data types and write programs that use two-way/ multi-way selection 2.To select the best loop construct for a given problem
		CO3	To design and implement programs to analyze the different pointer applications

		CO4	To decompose a problem into functions and to develop modular reusable code
		CO5	To apply file I/O operations
R201111	ENGINEERING DRAWING & DESIGN	CO1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections
		CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
		CO3	Understand and draw projection of solids in various positions in first quadrant
		CO4	Explain principles behind development of surfaces
		CO5	Prepare isometric and perspective sections of simple solids.
R201112	ELECTRICAL ENGINEERING WORKSHOP	CO1	Explain the limitations, tolerances, safety aspects of electrical systems and wiring
		CO2	Select wires/cables and other accessories used in different types of wiring
		CO3	Make simple lighting and power circuits.
		CO4	Measure current, voltage and power in a circuit.
		CO5	Able to understand Assembling electronic components on bread board
R201113	PROGRAMMING FOR PROBLEM SOLVING USING C LAB	CO1	Gains Knowledge on various concepts of a C language.
		CO2	Draw flowcharts and write algorithms
		CO3	Design and development of C problem solving skills.
		CO4	Design and develop modular programming skills.
		CO5	Trace and debug a program
I YEAR SEMESTER-II			
R201206	MATHEMATICS-III	CO1	1.interpret the physical meaning of different operators such as gradient, curl and divergence (L5) 2. estimate the work done against a field, circulation and flux using vector calculus (L5
			apply the Laplace transform for solving differential

		CO2	equations (L3)
		CO3	find or compute the Fourier series of periodic signals (L3) know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
		CO4	identify solution methods for partial differential equations that model physical processes (L3)
		CO5	identify solution methods for partial differential equations that model physical processes (L3)
R201207	APPLIED PHYSICS	CO1	Explain the need of coherent sources and the conditions for sustained interference (L2)
		CO2	1.Understand the basic concepts of LASER light Sources (L2) 2.Explain the working principle of optical fibers (L2)
		CO3	1.Interpret the concepts of classical and quantum free electron theories (L2) 2. Explain the importance of K-P mode
		CO4	1.Explain the concept of dielectric constant and polarization in dielectric materials (L2) 2.Classify the magnetic materials based on susceptibility and their temperature dependence (L2)
		CO5	1.Classify the energy bands of semiconductors (L2) 2. Explain Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

R201208	DATA STRUCTURES THROUGH C	CO1	data structures concepts with arrays, stacks, queues
		CO2	linked lists for stacks, queues and for other app
		CO3	traversal methods in the Trees
		CO4	various algorithms available for the graphs.
		CO5	sorting and searching in the data retrieval applications
R201209	ELECTRICAL CIRCUIT ANALYSIS -I	CO1	1.Various electrical networks in presence of active and passive elements. 2.Electrical networks with network topology concepts
		CO2	Any magnetic circuit with various dot conventions
		CO3	Any R, L, C network with sinusoidal excitation
		CO4	1.Any R, L, C network with sinusoidal excitation. 2.Any R, L, network with variation of any one of the parameters i.e., R, L, C and f.
		CO5	Electrical networks by using principles of network theorems.
R201227	BASIC CIVIL AND MECHANICAL ENGINEERING	CO1	Apply Shear force diagram & Bending moment diagram principles for Cantilever and Simply supported beams
		CO2	Apply concepts of Rosette analysis for strain measurements
		CO3	Analyse the characteristics of common building materials
		CO4	Compare the working characteristics of Internal Combustion engines

		CO5	Compare the differences between boiler mountings and accessories
R201251	BASIC CIVIL AND MECHANICAL ENGINEERING LAB	CO1	Solve to arrive at finding constant speed and variable speed on IC engines and interpret their performance.
		CO2	Estimate energy distribution by conducting heat balance test on IC engines
		CO3	Determine fluid and flow properties.
		CO4	Solve for drag coefficients.
		CO5	Test for the performance of pumps and turbines

R201234	DATA STRUCTURES THROUGH C LAB	CO1	Be able to design and analyze the time and space efficiency of the data structure
		CO2	Be capable to identify the appropriate data structure for given problem
		CO3	Have practical knowledge on the applications of data structures

R201229	CONSTITUTION OF INDIA	CO1	Understand the concept of Indian constitution
		CO2	1.Understand the structure of Indian government 2.Know the Structure of supreme court and High court
		CO3	1.Understand the structure of state government 2. Analyze the role Governor and Chief Minister
		CO4	1. Understand the local Administration 2. Evaluate Zilla panchayat block level organization
		CO5	1. Know the role of Election Commission apply knowledge 2. Analyze role of state election commission

B TECH -II YEAR- I SEM

R2021021	MATHEMATICS-IV	CO1	apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
		CO2	find the differentiation and integration of complex functions used in engineering problems (L5)
		CO3	make use of the Cauchy residue theorem to evaluate certain integrals (L3)
		CO4	design the components of a classical hypothesis test (L6)
		CO5	infer the statistical inferential methods based on small and large sampling tests (L4)
R2021022	ELECTRONIC		

	DEVICES AND CIRCUITS	CO1	Understand the basic concepts of semiconductor physics.
		CO2	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
		CO3	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
		CO4	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
		CO5	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations
R2021023	ELECTRICAL CIRCUIT ANALYSIS - II	CO1	Understand the concepts of balanced and unbalanced three-phase circuits
		CO2	Know the transient behavior of electrical networks with DC excitations
		CO3	Learn the transient behavior of electrical networks with AC excitations
		CO4	Estimate various parameters of a two port network.
		CO5	Understand the significance of filters in electrical networks
R2021024	DC MACHINES AND TRANSFORMERS	CO1	1.Assimilate the concepts of electromechanical energy conversion. 2. Mitigate the ill-effects of armature reaction and improve commutation in dc machines
		CO2	Understand the torque production mechanism and control the speed of dc motors
		CO3	Analyze the performance of single phase transformers
		CO4	Predetermine regulation, losses and efficiency of single phase transformers.
		CO5	Parallel transformers, control voltages with tap changing methods and achieve three-phase to two-phase transformation
R2021025	ELECTRO MAGNETIC FIELDS	CO1	Compute electric fields and potentials using Gauss law or solve Laplace's or Poisson's equations for various electric charge distributions
		CO2	Calculate the capacitance and energy stored in dielectrics
		CO3	Calculate the magnetic field intensity due to current carrying conductor and understanding the application of Ampere's law, Maxwell's second and third law
			Estimate self and mutual inductances and the energy stored

		CO4	in the magnetic field
		CO5	Understand the concepts of displacement current and Poynting theorem and Poynting vector
R2021026	ELECTRICAL CIRCUITS LAB		Apply various theorems
		CO1	
		CO2	Determination of self and mutual inductances
		CO3	Two port parameters of a given electric circuits
		CO4	Draw locus diagram
	CO5	Draw Waveforms and phasor diagrams for lagging and leading networks	
R2021027	DC MACHINES AND TRANSFORMERS LAB	CO1	Determine and predetermine the performance of DC machines and Transformers
		CO2	Control the speed of DC motor
		CO3	Obtain three phase to two phase transformation
R2021028	ELECTRONIC DEVICES AND CIRCUITS LAB	CO1	Analyze the characteristics of diodes, transistors and other devices
		CO2	Design and implement the rectifier circuits, SCR and UJT in the hardware circuits
		CO3	Design the biasing and amplifiers of BJT and FET amplifiers
		CO4	Measure electrical quantities using CRO in the experimentation
R2021029	SKILL ORIENTED COURSE DESIGN OF ELECTRICAL CIRCUITS USING ENGINEERING SOFTWARE TOOLS	CO1	write the MATLAB programs to simulate the electrical circuit problems
		CO2	simulate various circuits for electrical parameters
		CO3	simulate various wave form for determination of wave form parameters
		CO4	simulate RLC series and parallel resonance circuits for resonant parameters
		CO5	simulate magnetic circuits for determination of self and mutual inductances
R2021020	PROFESSIONAL ETHICS & HUMAN VALUES	CO1	Learn about morals, values & work ethics.
		CO2	Learn about the ethical responsibilities of the engineers
		CO3	Demonstrate knowledge to become a social experimenter
		CO4	Create awareness about safety, risk & risk benefit analysis.
		CO5	Create awareness on computer and environmental ethics

B.Tech – II Year II Semester		
Course Code	Course Name	Course Outcomes
		CO1 Develop essential programming skills in computer programming concepts like data types, containers

R2022021	PYTHON PROGRAMMING	CO2	Apply the basics of programming in the Python language Solve coding tasks related conditional execution, loops
		CO3	Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming
R2022022	DIGITAL ELECTRONICS	CO1	Classify different number systems and apply to generate various codes.
		CO2	Use the concept of Boolean algebra in minimization of switching functions
		CO3	Design different types of combinational logic circuits.
		CO4	Apply knowledge of flip-flops in designing of Registers and counters
		CO5	The operation and design methodology for synchronous sequential circuits and algorithmic state machines.
R2022023	POWER SYSTEMS - I	CO1	Identify the different components of thermal power plants.
		CO2	Identify the different components of nuclear Power plants.
		CO3	Identify the different components of air and gas insulated substations.
		CO4	Identify single core and three core cables with different insulating materials.
		CO5	Analyse the different economic factors of power generation and tariffs.
R2022024	INDUCTION AND SYNCHRONOUS MACHINES	CO1	Explain the operation and performance of three phase induction motor.
		CO2	Analyze the torque-speed relation, performance of induction motor and induction generator.
		CO3	Implement the starting of single phase induction motors.

		CO4	Develop winding design and predetermine the regulation of synchronous generators.
		CO5	Explain hunting phenomenon, implement methods of starting and correction of power factor with synchronous motor.
R2022015	MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product.
		CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
		CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
		CO4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
		CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
R2022025	PYTHON PROGRAMMING LAB	CO1	Write, Test and Debug Python Programs
		CO2	Use Conditionals and Loops for Python Programs
		CO3	Use functions and represent Compound data using Lists, Tuples
		CO4	Dictionaries Use various applications using python
R2022026	INDUCTION AND SYNCHRONOUS MACHINES LAB	CO1	Assess the performance of single phase and three phase induction motors.
		CO2	Control the speed of three phase induction motor.
		CO3	Predetermine the regulation of three-phase alternator by various methods.
		CO4	Find the X_d/X_q ratio of alternator and assess the performance of three-phase synchronous motor.

		CO5	Determine the performance of single phase AC series motor.
R2022027	DIGITAL ELECTRONICS LAB	CO1	Learn the basics of gates, flip-flops and counters.
		CO2	Construct basic combinational circuits and verify their functionalities.
		CO3	Apply the design procedures to design basic sequential circuits.
		CO4	To understand the basic digital circuits and to verify their operation.
		CO5	Apply Boolean laws to simplify the digital circuits.
R2022028	SKILL ORIENTED COURSE IOT APPLICATIONS OF ELECTRICAL ENGINEERING	CO1	Apply various technologies of Internet of Things to real time applications.
		CO2	Apply various communication technologies used in the Internet of Things.
		CO3	Connect the devices using web and internet in the IoT environment.
		CO4	Implement IoT to study Smart Home, Smart city, etc.

B.Tech – III Year I Semester

Course Code	Course Name	Course Outcomes	
R2031021	POWER SYSTEMS–II	CO1	Calculate parameters of transmission lines for different circuit configurations.
		CO2	Determine the performance of short, medium and long transmission lines.
		CO3	Analyse the effect of travelling waves on transmission lines.
		CO4	Analyse the various voltage control methods and effect of corona.

		CO5	Calculate sag/tension of transmission lines and performance of line insulators.
R2031022	POWER ELECTRONICS	CO1	Illustrate the static and dynamic characteristics of SCR, Power-MOSFET and Power-IGBT.
		CO2	Analyse the operation of phase-controlled rectifiers.
		CO3	Analyse the operation of three-phase full-wave converters, AC Voltage Controllers and Cyclo converters.
		CO4	Examine the operation and design of different types of DC-DC converters.
		CO5	Analyse the operation of PWM inverters for voltage control and harmonic mitigation.
R2031023	CONTROL SYSTEMS	CO1	Derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
		CO2	Determine time response specifications of second order systems and absolute and relative stability of LTI systems using Routh's stability criterion and root locus method.
		CO3	Analyze the stability of LTI systems using frequency response methods.
		CO4	Design Lag, Lead, Lag-Lead compensators to improve system performance using Bode diagrams.
		CO5	Represent physical systems as state models and determine the response. Understand the concepts of controllability and observability.
R203102B	UTILIZATION OF ELECTRICAL ENERGY	CO1	Identify various illumination methods produced by different illuminating sources.
		CO2	Identify a suitable motor for electric drives and industrial applications
		CO3	Identify most appropriate heating and welding techniques for suitable applications.
		CO4	Distinguish various traction system and determine the tractive effort and specific energy consumption.
		CO5	Validate the necessity and usage of different energy storage schemes for different applications and comparisons.

R2031024	CONTROL SYSTEMS LABORATORY	CO1	Analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and synchros.
		CO2	Design P,PI,PD and PID controllers, Design lag, lead and lag-lead compensators & Evaluate temperature control of an oven using PID controller.
		CO3	Determine the transfer function of D.C Motor, Analyze the performance of D.C and A.C Servo Motor & Test the controllability and observability.
		CO4	Judge the stability in time and frequency domain.
		CO5	To examine different logic gates and Boolean expressions using PLC.
R2031025	POWER ELECTRONICS LABORATORY	CO1	Analyse characteristics of various power electronic devices and design firing circuits for SCR.
		CO2	Analyse the performance of single-phase dual, three-phase full-wave bridge converters and dual converter with both resistive and inductive loads.
		CO3	Examine the operation of Single-phase AC voltage regulator and Cyclo converter with resistive and inductive loads.
		CO4	Differentiate the working and control of Buck converter and Boost converter.
		CO5	Differentiate the working & control of Square wave inverter and PWM inverter.
R2031026	SOFT SKILL COURSE EMPLOYABILITY SKILLS	CO1	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
		CO2	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
		CO3	Analyze, summarize and present information in quantitative forms including table, graphs and formulas
		CO4	Understand the core competencies to succeed in professional and personal life
		CO5	Learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc.
		CO1	Understanding of the natural resources.

R2031027	ENVIRONMENTAL SCIENCE	CO2	Understanding of the ecosystem and its diversity.
		CO3	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
		CO4	Understanding of the environmental impact of developmental activities.
		CO5	Awareness on the social issues, environmental legislation and global treaties.

B.Tech – III Year II Semester

Course Code	Course Name	Course Outcomes	
R2032021	MICROPROCESSORS AND MICROCONTROLLERS	CO1	Know the concepts of the Microprocessor capability in general and explore the evaluation of microprocessors.
		CO2	Analyse the instruction sets - addressing modes - minimum and maximum modes operations of 8086 Microprocessors
		CO3	Analyse the Microcontroller and interfacing capability
		CO4	Describe the architecture and interfacing of 8051 controller
		CO5	Know the concepts of PIC micro controller and its programming.
R2032022	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	CO1	Know the construction and working of various types of analog instruments.
		CO2	Describe the construction and working of wattmeter and power factor meters
		CO3	Know the construction and working various bridges for the measurement resistance - inductance and capacitance
		CO4	Know the operational concepts of various transducers
		CO5	Know the construction and operation digital meters
		CO1	Draw impedance diagram for a power system network and calculate per unit quantities.

R2032023	POWER ANALYSIS SYSTEM	CO2	Apply the load flow solution to a power system using different methods.
		CO3	Form Zbus for a power system networks and analyse the effect of symmetrical faults.
		CO4	Find the sequence components for power system Components and analyse its effects of unsymmetrical faults.
		CO5	Analyse the stability concepts of a power system.
R203202D	SWITCHGEAR AND PROTECTION	CO1	Illustrate the principles of arc interruption for application to high voltage circuit breakers of air - oil - vacuum - SF6 gas type.
		CO2	Analyse the working principle and operation of different types of electromagnetic protective relays.
		CO3	Acquire knowledge of protective schemes for generator and transformers for different fault conditions.
		CO4	Classify various types of protective schemes used for feeders and bus bar protection and Types of static relays.
		CO5	Analyse the operation of different types of over voltages protective schemes required for insulation co-ordination and types of neutral grounding.
R2032024	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY	CO1	Know about the phantom loading. & Learn the calibration process.
		CO2	Measure the electrical parameters voltage - current - power - energy and electrical characteristics of resistance - inductance and capacitance.
		CO3	Gain the skill knowledge of various bridges and their applications.
		CO4	Learn the usage of CT's - PT's for measurement purpose.
		CO5	Know the characteristics of transducers. & Measure the strains - frequency and phase difference
R2032025	MICRO PROCESSORS AND MICRO CONTROLLERS LAB	CO1	Write assembly language program using 8086 microprocessor based on arithmetic - logical - number systems and shift operations.
		CO2	Write assembly language programs for numeric operations and array handling problems.
		CO3	Write a assembly program on string operations. & Interface 8086 with I/O and other devices.

		CO4	Do parallel and serial communication using 8051 & PIC 18 micro controllers.
		CO5	Program microprocessors and microcontrollers for real world applications.
R2032026	POWER SYSTEMS AND SIMULATION LAB	CO1	Estimate the sequence impedances of 3-phase Transformer and Alternators.
		CO2	Evaluate the performance of transmission lines.
		CO3	Analyse and simulate power flow methods in power systems.
		CO4	Analyse and simulate the performance of PI controller for load frequency control.
		CO5	Analyse and simulate stability studies of power systems.
R2032027	SKILL ADVANCED COURSE MACHINE LEARNING WITH PYTHON	CO1	Illustrate and comprehend the basics of Machine Learning with Python
		CO2	Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
		CO3	Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
		CO4	Evaluate the concepts of binning, pipeline Interfaces with examples
		CO5	Apply the sentiment analysis for various case studies
R2032028	RESEARCH METHODOLOGY	CO1	Understand objectives and characteristics of a research problem
		CO2	Analyze research related information and to follow research ethics.
		CO3	Understand the types of intellectual property rights.
		CO4	Learn about the scope of IPR.
		CO5	Understand the new developments in IPR.

B.Tech – IV Year I Semester

Course Code	Course Name	Course Outcomes	
R204102E	DATA BASE MANAGEMENT SYSTEMS	CO1	Illustrate the concept of databases, database management systems, database languages, database structures and their work
		CO2	Apply ER modeling and Relational modeling for designing simple databases.
		CO3	Summarize the concepts related to relational model and SQL and Write database queries using relational algebra and structured query language.
		CO4	Design and develop databases from the real world by applying the concepts of Normalization.
		CO5	Outline the issues associated with Transaction Management and Recovery, Tree Structured Indexing
R204102F	HYBRID ELECTRIC VEHICLES	CO1	Know the concept of electric vehicles and hybrid electric vehicles.
		CO2	Familiar with different configuration of hybrid electric vehicles.
		CO3	Choose an effective motor for EV and HEV application
		CO4	Understand the power converters used in hybrid electric vehicles
		CO5	Know different batteries and other energy storage systems.
R204102I	POWER SYSTEM OPERATION AND CONTROL	CO1	Compute optimal load scheduling of Generators.
		CO2	Formulate hydrothermal scheduling and unit commitment problem..
		CO3	Analyse effect of Load Frequency Control for single area systems
		CO4	Analyse effect of Load Frequency Control for two area systems
		CO5	Describe the effect of reactive power control for transmission lines.

R2041011	UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY	CO1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
		CO2	Identify the multiple ethical interests at stake in a real-world situation or practice
		CO3	Articulate what makes a particular course of action ethically defensible
		CO4	Assess their own ethical values and the social context of problems
		CO5	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
R204102Q	SKILL ADVANCED COURSE MACHINE LEARNING WITH PYTHON LAB	CO1	Illustrate and comprehend the basics of Machine Learning with Python
		CO2	Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
		CO3	Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
		CO4	Evaluate the concepts of binning, pipeline Interfaces with examples
		CO5	Apply the sentiment analysis for various case studies
R204105T	Internet of things	CO1	Review Internet of Things (IoT).
		CO2	Demonstrate various business models relevant to IoT.
		CO3	Construct designs for web connectivity
		CO4	Organize sources of data acquisition related to IoT, integrate to enterprise systems.
		CO5	Describe IoT with Cloud technologies.
R20	Machine learning	CO1	Explain the definition and usage of the term 'the internet of things' in different Contexts
R2041057		CO2	Demonstrate on various network protocols used in IoT
		CO3	Analyze on various key wireless technologies used in IoT systems, such as WiFi, 6LoWPAN, Bluetooth and ZigBee.
		CO4	Illustrate on the role of big data, cloud computing and data analytics in IoT system

		CO5	wireless network connection, data analytics and display/actuators, and write the necessary control software
IV-YEAR SEMESTER-II			
R204202P	Project, Seminar, Internship	CO1	Demonstrate the technical knowledge to identify problems in the field of Electrical & Electronics Engineering and its allied areas
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects
		CO4	Design engineering solutions for solving complex engineering problems
		CO5	Develop effective communication skills, professional behavior and team work

**B.TECH MECHANICAL ENGINEERING
(R20)**

Course Code	Course Name	Course Outcomes
I-I		
R201104	Engineering Drawing	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
		Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
		Understand and draw projection of solids in various positions in first quadrant.
		Explain principles behind development of surfaces.
		Prepare isometric and perspective sections of simple solids.
I-II		
R201210	Engineering Mechanics	The student should be able to draw free body diagrams for FBDs for particles and rigid bodies in plane and space and problems to solve the unknown forces, orientations and geometric parameters.
		The student should be able to determine centroid for lines, areas and center of gravity for volumes and their composites.
		The student should be able to determine area and mass movement of inertia for composite sections
		The student should be able to analyze motion of particles and rigid bodies and apply the principles of motion, work energy and impulse – momentum.
R201254	Thermodynamics	After undergoing the course the student is expected to learn Basic concepts of thermodynamics
		After undergoing the course the student is expected to learn Laws of thermodynamics
		After undergoing the course the student is expected to learn Concept of entropy
		After undergoing the course the student is expected to learn Property evaluation of vapors and their depiction in tables and charts
		After undergoing the course the student is expected to learn Evaluation of properties of perfect gas mixtures
R2012032	Workshop Practice Lab	Identify workshop tools and their operational capabilities.
		Practice on manufacturing of components using workshop trades including fitting, carpentry, and foundry and welding.
		Apply fitting operations in various applications.
		Apply basic electrical engineering knowledge for House Wiring Practice

Course Code	Course Name	Course Outcomes	
II-I			
R2021011	VECTOR CALCULUS FOURIER TRANSFORMS and PDE (M-III)	CO1	The student will be able to interpret the physical meaning of different operators such as gradient, curl and divergence
		CO2	The student will be able to estimate the work done against a field, circulation and flux using vector calculus and apply the Laplace transform for solving differential equations
		CO3	The student will be able to find or compute the Fourier series of periodic signals
		CO4	The student will be able to know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
		CO5	The student will be able to identify solution methods for partial differential equations that model physical processes
R2021031	MECHANICS OF SOLIDS	CO1	Model & Analyze the behavior of basic structural members subjected to various loading and support conditions based on principles of equilibrium.
		CO2	Understand the apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, moment and torsional moment.
		CO3	Students will learn all the methods to analyze beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components. Students are able to analyze beams and draw correct and complete shear and bending moment diagrams for beams.
		CO4	Students attain a deeper understanding of the loads, stresses, and strains acting on a structure and their relations in the elastic behavior
R2021032	FLUID MECHANICS & HYDRAULIC MACHINES	CO1	The basic concepts of fluid properties.
		CO2	The mechanics of fluids in static and dynamic conditions.
		CO3	Boundary layer theory, flow separation and dimensional analysis.
		CO4	Hydrodynamic forces of jet on vanes in different positions.
		CO5	Working Principles and performance evaluation of hydraulic pump and turbines.
R2021033	PRODUCTION TECHNOLOGY	CO1	Able to design the patterns and core boxes for metal casting processes
		CO2	Able to design the gating system for different metallic components
		CO3	Know the different types of manufacturing processes
		CO4	Be able to use forging, extrusion processes
		CO5	Learn about the different types of welding processes

			used for special fabrication.
R2021034	KINEMATICS OF MACHINERY	C01	The student should be able to Contrive a mechanism for a given plane motion with single degree of freedom.
		C02	The student should be able to Suggest and analyze a mechanism for a given straight line motion and automobile steering motion.
		C03	The student should be able to Analyze the motion (velocity and acceleration) of a plane mechanism.
		C04	The student should be able to Suggest and analyze mechanisms for a prescribed intermittent motion like opening and closing of IC engine valves etc.
		C05	The student should be able to Select a power transmission system for a given application and analyze motion of different transmission systems
R2021035	COMPUTER AIDED ENGINEERING DRAWING PRACTICE	C01	Student gets exposed on working of sheet metal with help of development of surfaces.
		C02	Student understands how to know the hidden details of machine components with the help of sections and interpenetrations of solids.
		C03	Student shall exposed to modeling commands for generating 2D and 3D objects using computer aided drafting tools which are useful to create machine elements for computer aided analysis.
R2021036	FLUID MECHANICS & HYDRAULIC MACHINERY LAB	C01	The student will be able to identify importance of various fluid properties at rest and in transit.
		C02	The student will be able to derive and apply general governing equations for various fluid flows.
		C03	The student will be able to evaluate the performance characteristics of hydraulic turbines and pumps.
R2021037	PRODUCTION TECHNOLOGY LAB	C01	To apply some of the manufactures process directly in the industry for preparation of complicated jobs.
		C02	At the end of the lab learn preparation of various jobs using various manufacturing process
		C03	The student will be trained to implement similar features in preparation of jobs can be extended to implement in the preparation of complicated jobs
R2021038	DRAFTING AND MODELING LAB	C01	Learned basic concept to drawing, edit, dimension, hatching etc. to develop 2&3D Modeling.
		C02	Able to make 3D modeling, Assembling, modification & manipulation along with detailing.
		C03	Able to prepare surface modeling and sheet metal operations through various exercises
R2021039	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	C01	After completion of the course, students will be able to Understand the concept of Traditional knowledge and its importance
		C02	After completion of the course, students will be able to Know the need and importance of protecting traditional knowledge
		C03	After completion of the course, students will be able to Know the various enactments related to the protection of traditional knowledge
		C04	After completion of the course, students will be able to Understand the concepts of Intellectual property to protect the traditional knowledge

Course Code	Course Name	Course Outcomes	
II-II			
R2022031	MATERIALS SCIENCE & METALLURGY	C01	Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.
		C02	Study the behavior of ferrous and non ferrous metals and alloys and their application in different domains
		C03	Able to understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals.
		C04	Grasp the methods of making of metal powders and applications of powder metallurgy
		C05	Comprehend the properties and applications of ceramic, composites and other advanced methods.
R2022011	COMPLEX VARIABLES AND STATISTICAL METHODS	C01	the course students will be able to apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic
		C02	the course students will be able to find the differentiation and integration of complex functions used in engineering problems
		C03	the course students will be able to make use of the Cauchy residue theorem to evaluate certain integrals
		C04	the course students will be able to apply discrete and continuous probability distributions
		C05	the course students will be able to design the components of a classical hypothesis test and infer the statistical inferential methods based on small and large sampling tests
R2022032	DYNAMICS OF MACHINERY	C01	To compute the frictional losses and transmission in clutches, brakes and dynamometers
		C02	To analyze the forces in four bar and slider crank mechanisms and design a flywheel
		C03	To determine the effect of gyroscopic couple in motor vehicles, ships and aero planes To determine the rotary unbalanced mass in reciprocating equipment
		C04	To determine the unbalanced forces and couples in reciprocating and radial engines
		C05	To determine the natural frequencies of discrete systems undergoing longitudinal, torsional and transverse vibrations.
R2022033	THERMAL ENGINEERING - I	C01	Student must able to Derive the actual cycle from fuel-air cycle and air- standard cycle for all practical applications
		C02	Student must able to Explain working principle and various components of IC engine
		C03	Student must able to Explain combustion phenomenon of CI and SI engines and their impact on engine variables. Analyze the performance of an IC engine based on the performance parameters.
		C04	Student must able to Explain the cycles and systems of a gas turbine and determine the efficiency of gas turbine
		C05	Student must able to Explain the applications and working principle of rockets and jet propulsion
R2022034	INDUSTRIAL	C01	Design and conduct experiments, analyse, interpret

	ENGINEERING AND MANAGEMENT		data and synthesize valid conclusions
		C02	Design a system, component, or process, and synthesize solutions to achieve desired needs
		C03	Use the techniques, skills, and modern engineering tools necessary for engineering practice
		C04	Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints
		C05	Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management
R2022035	MECHANICS OF SOLIDS & METALLURGY LAB	CO1	Determination of mechanical properties of different materials AND Establish the constitutive relations in metals using destructive methods
		CO2	Understand the behavior of members during twisting and transverse loading and Familiarize with standard test specimens
		CO3	The material properties and testing methods along with crystal structures and deformations, Hardenability of steels by Jominy End Quench Test and Prepare samples for investigating micro structure of different materials.
R2022036	MACHINE DRAWING PRACTICE	C01	Draw and represent standard dimensions of different mechanical fasteners and joints and Couplings.
		C02	Draw different types of bearings showing different components.
		C03	Assemble components of a machine part and draw the sectional assembly drawing showing the dimensions of all the components of the assembly as per bill of materials
		C04	Select and represent fits and geometrical form of different mating parts in assembly drawings.
		C05	To prepare manufacturing drawings indicating fits, tolerances, surface finish and surface treatment requirements.
R2022037	THEORY OF MACHINES LAB	CO1	understand the kinematics and rigid- body dynamics of kinematically driven machine components
		CO2	understand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link
		CO3	Students can understand the Gear terminology and able to analyze the spur gear trains.
R2022038	PYTHON PROGRAMMING LAB	C01	student will be able to Solve the different methods for linear, non-linear and differential equations
		C02	student will be able to Learn the PYTHON Programming language
		C03	student will be able to Familiar with the strings and matrices in PYTHON
		C04	student will be able to Write the Program scripts and functions in PYTHON to solve the methods

Course Code	Course Name	Course Outcomes	
III-I			
R2031031	Thermal Engineering-II	CO1	Student will be able to Explain the basic concepts of thermal engineering and boilers
		CO2	Student will be able to Discuss the concepts of steam nozzles and steam turbines.
		CO3	Student will be able to Gain knowledge about the concepts of reaction turbine and steam condensers.
		CO4	Student will be able to Discuss the concepts of reciprocating and rotary type of compressors.
		CO5	Student will be able to Acquire knowledge about the centrifugal and axial flow compressors.
R2031032	Design of Machine Members-I	CO1	Student will be able to Judge about materials and their properties along with manufacturing considerations.
		CO2	Student will be able to Gain knowledge about the strength of machine elements
		CO3	Student will be able to Apply the knowledge in designing the riveted and welded joints, keys, cotters and knuckle joints.
		CO4	Student will be able to Apply the knowledge in designing the shafts and shaft couplings.
		CO5	Student will be able to Apply the knowledge in designing the mechanical springs.
R2031033	MACHINING, MACHINE TOOLS & METROLOGY	CO1	Student will be able to Discuss the concepts of machining processes.
		CO2	Student will be able to Apply the principles of lathe, shaping, slotting and planning machines.
		CO3	Student will be able to Apply the principles of drilling, milling and boring processes.
		CO4	Student will be able to Analyze the concepts of finishing processes and the system of limits and fits.
		CO5	Student will be able to Learn the concepts of surface roughness and optical measuring instruments
R203102F	RENEWABLE ENERGY SOURCES(OE-I)	CO1	Student will be able to Explain the importance of, solar energy collection and storage.
		CO2	Student will be able to Discuss the wind energy principles.
		CO3	Student will be able to Analyze about biomass energy concepts.
		CO4	Student will be able to Apply the principles of tidal energy.
		CO5	Student will be able to Utilize the concepts of geothermal energy.
R203103C	ADVANCED MATERIALS (PE-1)	CO1	Student will be able to Justify the knowledge about metals and alloys and their utility in different environments.

		CO2	Student will be able to Judge about polymers and ceramics and their applications.
		CO3	Student will be able to Analyze composite materials along with reinforcements and their applications.
		CO4	Student will be able to Utilize shape memory alloys and functionally graded materials for different applications
		CO5	Student will be able to Justify about the nano materials and their applications
R2031034	MACHINE TOOLS LABORATORY	CO1	Student will be able to Demonstrate about general purpose machine tools in the machine shop.
		CO2	Student will be able to Perform various operations on lathe machine.
		CO3	Student will be able to Perceive different operations on drilling machine.
		CO4	Student will be able to Experiment with basic operations on shaping machine.
		CO5	Student will be able to Utilize slotting machine to make keyways.
		CO6	Student will be able to Experiment with the basic operations on milling machine.
R2031035	Thermal Engineering Lab	CO1	Student will be able to Experiment with two stroke and four stroke compression and spark ignition engines for various characteristics.
		CO2	Student will be able to Perceive flash point, fire point, calorific value of different fuels using various apparatus.
		CO3	Student will be able to Perform engine friction, heat balance test, volumetric efficiency, load test of petrol and diesel engines.
		CO4	Student will be able to Perform speed test, performance test and cooling temperature on petrol and diesel engines.
		CO5	Student will be able to Utilize air compressor for its performance test and to determine efficiency.
		CO6	Student will be able to Discuss the principles through assembly and disassembly of 2/3 wheelers, 2/4 stroke engines, tractor, heavy duty engines, boilers and their mountings and accessories.
R2031036	ADVANCED COMMUNICATION SKILLS LAB	CO1	Students will be able to Acquire vocabulary and use it contextually
		CO2	Students will be able to Listen and speak effectively
		CO3	Students will be able to Develop proficiency in academic reading and writing
		CO4	Students will be able to Increase possibilities of job prospects
R2031037	PROFESSIONAL ETHICS AND HUMAN VALUES	CO1	At the end of the course, student will be able to Judge the concepts of human values.
		CO2	At the end of the course, student will be able to Justify knowledge about the principles of engineering ethics.
		CO3	At the end of the course, student will be able to Interpret engineering as social

			experimentation
		C04	At the end of the course, student will be able to Realize engineers' responsibility for safety and risk.
		C05	At the end of the course, student will be able to Learn about the engineers' rights and responsibilities

Course Code	Course Name	Course Outcomes	
III-II			
R2032031	Heat Transfer	CO1	Student will be able to Apply knowledge about mechanism and modes of heat transfer.
		CO2	Student will be able to Understand the concepts of conduction and convective heat transfer.
		CO3	Student will be able to Learn about forced and free convection.
		CO4	Student will be able to Analyze the concepts of heat transfer with phase change and condensation along with heat exchangers.
		CO5	student will be able to Interpret the knowledge about radiation mode of heat transfer
R2032032	Design of Machine Members-II	CO1	Student will be able to Apply knowledge about the design of bearings.
		CO2	Student will be able to Explain the concepts in designing various engine parts.
		CO3	Student will be able to Utilize the knowledge to design curved beams and power screws.
		CO4	Student will be able to Justify power transmission systems and to design pulleys and gear drives.
		CO5	Student will be able to Apply the concepts in designing various machine tool elements.
R2032033	INTRODUCTION TO ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	CO1	Student will be able to Discuss basic concepts of artificial intelligence, neural networks and genetic algorithms.
		CO2	Student will be able to Apply the principles of knowledge representation and reasoning.
		CO3	Student will be able to Learn about bayesian and computational learning and machine learning.
		CO4	Student will be able to Utilize various machine learning techniques.
		CO5	Student will be able to Apply the machine learning analytics and deep learning techniques.
R203203A	AUTOMOBILE ENGINEERING (PE-2)	CO1	Student will be able to Discuss various components of four wheeler automobile.
		CO2	Student will be able to Apply the knowledge of different parts of transmission system.
		CO3	Student will be able to Judge about steering and suspension systems.
		CO4	Student will be able to Justify the braking system and electrical system used in automobiles.
		CO5	Student will be able to Analyze the concepts about engine specifications and service, safety and electronic system used in automobiles
R203201E	ELEMENTS OF CIVIL ENGINEERING(OE-2)	CO1	Student will be able to basics of Civil Engineering concepts.
		CO2	Student will be able to the surveying the elevations and mapping.

		CO3	Student will be able to the construction materials and elements.
		CO4	Student will be able to water resource development.
		CO5	Student will be able to overall infrastructure development.
R2032034	HEAT TRANSFER LAB	CO1	Students are expected to learn the concepts and to Determine the heat transfer rate and coefficient.
		CO2	Students are expected to learn the concepts and to Determine the thermal conductivity, efficiency and effectiveness.
		CO3	Students are expected to learn the concepts and to Determine the emissivity and Stefan-Boltzman constant.
		CO4	Students are expected to learn the concepts and to Determine critical heat flux and investigate Lambert's cosine law.
		CO5	Students are expected to learn the concepts and to Experiment with Virtual labs and analyse conduction, HT coefficient
		CO6	Students are expected to learn the concepts and to Experiment with Virtual labs and investigate Lambert's laws.
R2032035	CAE & CAM Lab	CO1	Students are expected to learn the concepts and should be able to Experiment with trusses and beams to determine stress, deflection, natural frequencies, harmonic analysis, HT analysis and buckling analysis.
		CO2	Students are expected to learn the concepts and should be able to Create part programmes using FANUC controller.
		CO3	Students are expected to learn the concepts and should be able to Apply G-codes for automated tool path using CAM software.
		CO4	Students are expected to learn the concepts and should be able to Analyze about rapid prototyping machine and to print simple parts.
		CO5	Students are expected to learn the concepts and should be able to Experiment with virtual 3D printing simulation using V labs
R2032036	Measurements & Metrology lab	CO1	Student will be able to Demonstrate the calibration experiments with different gauges, transducers, thermocouple and temperature detector.
		CO2	Demonstrate the calibration experiments with rotameter, seismic apparatus.
		CO3	Demonstrate the calibration experiments with vernier calipers, micrometer, height and dial gauges.
		CO4	Analyze various machine tools for their alignment.
		CO5	Measure angular and taper measurements, straightness, surface roughness
R2032037	Artificial Intelligence and	CO1	At the end of the course, student will be able to apply the knowledge of artificial intelligence and machine learning models along with image

	Machine Learning Lab		classifiers and automatic facial recognition using various software tools.
R2032038	Research Methodology and IPR	C01	Student will be able to Understand objectives and characteristics of a research problem.
		C02	Student will be able to Analyze research related information and to follow research ethics.
		C03	Student will be able to Understand the types of intellectual property rights.
		C04	Student will be able to Learn about the scope of IPR.
		C05	student will be able to Understand the new developments in IPR.

Course Code	Course Name	Course Outcomes	
IV-I			
R2041011	Universal Human Values: Understanding Harmony	CO1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
		CO2	They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
		CO3	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
		CO4	This is only an introductory foundational input. It would be desirable to follow it up by a) faculty-student or mentor-mentee programs throughout their time with the institution b) Higher level courses on human values in every aspect of living. E.g. as a professional
R204103C	UNCONVENTIONAL MACHINING PROCESSES (PE-3)	CO1	Student will be able to Understand the concepts of modern machining processes.
		CO2	Student will be able to Learn the principles of ultrasonic machining.
		CO3	Student will be able to Apply the principles and procedure of electro chemical and chemical machining processes.
		CO4	Student will be able to Apply the principles and procedure of thermal metal removal processes.
		CO5	Student will be able to Illustrate the principles and procedure of electron beam machining, laser beam machining and plasma machining.
R204103H	POWER PLANT ENGINEERING (PE-4)	CO1	Student will be able to Identify the different components of the steam power plant for power production.
		CO2	Student will be able to Illustrate the component used in the diesel and gas power plant for power production.
		CO3	Student will be able to Understand how the power is produced by hydro-electric and nuclear power plants.
		CO4	Student will be able to Interpret the power production by combined power plants and operating principles of different instruments used in power plants.
		CO5	Student will be able to Analyze power plant economics and implementation of pollution

			standards and control of pollution caused by the power plants.
R204103Q	NON DESTRUCTIVE EVALUATION (PE-5)	CO1	Student will be able to Understand the concepts of various NDE techniques and the requirements of radiography techniques and safety aspects. CO2: CO3: CO4: CO5:
		CO2	Student will be able to Interpret the principles and procedure of ultrasonic testing (BL-2).
		CO3	Student will be able to Understand the principles and procedure of Liquid penetration and eddy current testing.
		CO4	Student will be able to Illustrate the principles and procedure of Magnetic particle testing.
		CO5	Student will be able to Interpret the principles and procedure of infrared testing and thermal testing.
R204101V	DISASTER MANAGEMENT(OE-3)	CO1	students will be able to Affirm the usefulness of integrating management principles in disaster mitigation work b. c. d.
		CO2	Students will be able to Distinguish between the different approaches needed to manage pre- during and post- disaster periods.
		CO3	Students will be able to Explain the process of risk management.
		CO4	Students will be able to Relate to risk transfer.
R204101R	ENVIRONMENTAL MANAGEMENT(OE-4)	CO1	Students will be able to a. Plan and design the water and wastewater systems.
		CO2	Students will be able Identify the source of emissions and select proper control systems.
		CO3	Students will be able Design & estimation of water supply system for a city.
		CO4	Students will be able to get knowledge about various environmental aspects.
		CO5	Students will be able Selection of suitable treatment flow for raw water treatments.
R204103Y	Mechatronics Lab	CO1	Student will be able to Understand the Characteristics of LVDT
		CO2	Student will be able to Measure load, displacement and temperature using analogue and digital sensors.
		CO3	Student will be able to Develop PLC programs for control of traffic lights, water level, lifts and conveyor belts.
		CO4	Student will be able to Simulate and analyze PID controllers for a physical system using MATLAB.
CO5	Student will be able to Develop pneumatic and hydraulic circuits using Automaton studio.		

Course Code	Course Name	Course Outcomes	
IV-II			
R2042031	Project work	CO1	The purpose of Project in Mechanical Engineering is to develop the necessary knowledge, understanding Practical knowedlege
		CO2	Demonstrated the ability to analyze, design and improve practical thermal and/or mechanical systems.
		CO3	To understand the mechanical behavior of understanding of designing process by gating data from actual project.
		CO4	Shown the ability to communicate effectively and work well on team based engineering projects
		CO5	Mechanical Engineering plays a vital role in the various field like thermal, production, design etc