



DHANEKULA INSTITUTE OF ENGINEERING & TECHNOLOGY

GANGURU :: VIJAYAWADA – 521 139

(Approved by AICTE New Delhi, Permanently Affiliated to JNTU Kakinada)

ISO 9001:2015 Certified Institution, Accredited by NBA for ME, EEE, ECE & CSE.

E-mail: diet.principal@gmail.com, principal@diet.ac.in, website: www.diet.ac.in, Phone: +91-8333924842, 8333924843

Department of Civil Engineering

A.Y. 2022-23

I-I & I-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
I-I MATHEMATICS-I R20C101	R20C101.1	Test the convergence of an infinite series
	R20C101.2	Apply ODE of first Order and first Degree to various engineering fields.
	R20C101.3	Apply Linear Differential Equations of higher order with constant coefficients to various engineering fields.
	R20C101.4	Utilize Partial differentiation in optimization of functions of several variables
	R20C101.5	Apply Double and Triple integration techniques in evaluating areas and volumes of bounded regions
I-I COMMUNICATIVE ENGLISH R20C102	R20C102.1	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
	R20C102.2	Form sentences using proper grammatical structures and correct word forms.
	R20C102.3	Recognize paragraph structure and be able to match beginnings, endings and headings with paragraphs.
	R20C102.4	Assess social, cultural and environmental issues with a scientific point of view.
I-I ENGINEERING PHYSICS R20C103	R20C103.1	Distinguish the phenomena of light- Interference, diffraction, polarization and determine the wavelength of given light using these phenomena.
	R20C103.2	Apply the concepts of light in optical fiber and lasers in communication system.
	R20C103.3	Calculate the energy of quantum particle at different energy levels and differentiate solids based on the band theory.
	R20C103.4	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications
	R20C103.5	Classify the semiconductors and study the properties of superconductors

I-I ENGINEERING DRAWING R20C104	R20C104.1	Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles. Curves:Parabola, Ellipse and Hyperbola, cycloids, involutes, tangents and normals for the curves. Scales: Plain scales, diagonal scales and vernier scales
	R20C104.2	Orthographic Projections: Projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane. Lines inclined to both the planes, determination of true lengths, angle of inclination and traces.
	R20C104.3	Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.
	R20C104.4	Projections of Solids :Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the planes.
	R20C104.5	Conversion of isometric views to orthographic views, Conversion of orthographic views to isometric views.
I-I ENGINEERING GEOLOGY R20C105	R20C105.1	Define the importance of geology in civil engineering and weathering process of rocks
	R20C105.2	Identify the physical properties various Minerals and Rocks
	R20C105.3	Recognize various secondary structures and their importance in civil engineering point of view.
	R20C105.4	Interpret the concept of Ground water, Earthquakes and landslides. Also Choose the suitable geophysical method required for identifying subsurface information and ground water potential and also defines Engineering properties of Rocks
	R20C105.5	Describe the importance and apply Geological principles for mitigation of natural hazards and select the sites of Dams, Reservoirs and tunnels
I-I ENGLISH COMMUNICATION SKILLS LABORATORY R20C106	R20C106.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C106.2	Speak fluently by practising accent, rhythm and intonation.
	R20C106.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.
	R20C106.4	Employ suitable reading strategies to get the general idea of a text and draft reports.
I-I ENGINEERING PHYSICS LAB R20C107	R20C107.1	Examine the physical properties of light using interference and diffraction.
	R20C107.2	Calculate the numerical aperture and acceptance angle of optical fiber
	R20C107.3	Calculate the rigidity modulus of the given material and measure the frequency of tuning fork using resonance method
	R20C107.4	Demonstrate the magnetizing behaviour of magnetic materials
	R20C107.5	Calculate the dielectric constant of a material
I-I	R20C108.1	Determine distances and irregular areas using conventional survey instruments like chain and tape.
	R20C108.2	Identify different soils.

BASICS OF CIVIL ENGG. WORK SHOP R20C108	R20C108.3	Know various traffic signs and signals.
	R20C108.4	Estimate quantities of construction materials and ingredients of concrete.
	R20C108.5	Be acquainted with welding and carpentry.
I-II MATHEMATICS-II R20C109	R20C109.1	Develop matrix techniques to find Eigen values and Eigen vectors
	R20C109.2	Apply Eigen values and Eigen vectors to reduce a quadratic form to canonical form by orthogonal transformation, and to singular value decomposition of a matrix
	R20C109.3	Apply iterative methods to solve algebraic equation/transcendental equation/system of linear equations
	R20C109.4	Interpolate data using various interpolating techniques.
	R20C109.5	Apply numerical techniques to find derivatives/to evaluate integrals/to solve initial value problems of first order, first degree ODE.
I-II ENGINEERING CHEMISTRY R20C110	R20C110.1	Elucidate polymerization techniques and identify suitable polymer material for a given engineering application.
	R20C110.2	Describe the working of primary cells, secondary cells and recognize control methods for standard types of corrosion.
	R20C110.3	Explicate characteristics, preparation methods and applications of materials (Nano materials, Refractories, Cement & Lubricants) with advanced techniques.
	R20C110.4	Estimate the calorific value, composition and flue gas analysis of solid, liquid and gaseous fuels.
	R20C110.5	Select the appropriate method of purification and softening by considering impurities or hardness present in water.
I-II ENGINEERING MECHANICS R20C111	R20C111.1	Compute resultant of forces in planer & spatial systems. Find out the Friction force in different cases
	R20C111.2	introduce concepts of free body diagrams and solutions to problems using graphical methods and law of triangle of forces
	R20C111.3	locate centroid and center of gravity of composite areas and composite bodies respectively
	R20C111.4	Compute area and mass moment of inertia of composite areas and composite bodies respectively and
	R20C111.5	Analyze the rectilinear& curvilinear motion of a by using principles of motion, Work-Energy Method, & Impulse momentum method
I-II PROGRAMMING FOR PROBLEM SOLVING USING C R20C112	R20C112.1	Acquires skills to write, compile and debug programs in C language.
	R20C112.2	Choose different operators, data types, and write programs that use two-way/ multi-way selection and able to select best loop construct for a given problem.
	R20C112.3	Analyze concepts of Arrays, multidimensional arrays, strings, string manipulation functions, structures and unions.
	R20C112.4	Implement pointers and compare structures and unions, preprocessor commands.

	R20C112.5	Decompose a problem into functions and to develop modular reusable code and apply File I/O operations.
I-II BUILDING MATERIALS AND CONCRETE R20C113	R20C113.1	Understanding various engineering properties of building construction materials
	R20C113.2	Understanding the functional role of ingredients of concrete
	R20C113.3	Applying the knowledge to concrete mix design
	R20C113.4	Understanding various engineering properties of hardened concrete
	R20C113.5	Understanding and analyzing the tests on hardened concrete
I-II ENGINEERING CHEMISTRY LABORATORY R20C114	R20C114.1	Handle Conductivity meter, Colorimeter, PH-meter and Potentiometer for analysis of materials using small quantities involved for quick and accurate results.
	R20C114.2	Carry out acid- base titrations for Standardization of acids and estimation of alkalinity present in the given samples.
	R20C114.3	Calculate the quantity of ferrous ion and Manganese ions by using redox titrations.
	R20C114.4	Perform quantitative interpretations of titration and be familiar with the concept of hardness, turbidity and total dissolved salts in water sample.
	R20C114.5	Demonstrate the chemistry of iodine as direct and indirect oxidizing agent.
I-II PROGRAMMING FOR PROBLEM SOLVING USING C LAB R20C115	R20C115.1	Gains Knowledge on various concepts of a C language.
	R20C115.2	Design and development of C problem solving skills.
	R20C115.3	Design and develop modular programming skills.
I-II BUILDING PLANNING AND COMPUTER AIDED R20C116	R20C116.1	Perform basic commands of any suitable CAD software to draw 2D drawings and Interpret the conventions, signs and symbols from a given drawing
	R20C116.2	Prepare line plans of residential and public buildings using principles of planning.
	R20C116.3	Prepare submission and working drawing from the given requirement for Load Bearing and Framed structures
I-II ENVIRONMENTAL SCIENCE R20C117	R20C117.1	Identify environmental issues from an interdisciplinary perspective and regulation of ecosystems.
	R20C117.2	Focus on sustainable usage of natural resources in global concern.
	R20C117.3	Interpret the importance of biodiversity and maintain ecological balance.
	R20C117.4	Categorize the various types of environmental pollution and their control methods.
	R20C117.5	Ascertain the environmental legislations to control the social issues and paraphrase the proposed methodologies for environmental management
I-I	R20C118.1	Identify physical properties of minerals

ENGINEERING GEOLOGY LAB R20C118	R20C118.2	Recognize physical properties of rocks
	R20C118.3	Appraise the profile and calculate the creek gradient and steep slopes of given geological maps
	R20C118.4	Interpret the strike and dip problems for a given simple structural Geology
	R20C118.5	Classify the soil by using bore hole data in ISC system
	R20C118.6	Evaluate the strength of rocks using laboratory tests
II-I & II-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
II-I MATHEMATICS-III R20C201	R20C201.1	Interpret the physical meaning of different operators such as gradient, curl and divergence and find the work done against a field, circulation and flux using vector calculus.
	R20C201.2	Apply the Laplace transform for solving Initial value problems.
	R20C201.3	Compute the Fourier series of periodic signals and applying integral expressions for the forward and inverse Fourier transforms.
	R20C201.4	Form PDEs and solve first order PDEs.
	R20C201.5	Identify solution methods for PDEs of higher order that model physical processes
II-I STRENGTH OF MATERIALS I R20C202	R20C202.1	Appraise Stress, Strain & Strain Energy in Uniform, Varying cross section and Composite Bars.
	R20C202.2	Sketch Shear Force & Bending Moment diagrams, for different beams subjected to various types of loading.
	R20C202.3	Evaluate bending stresses & Shear stresses in beams of various cross sections for different loading conditions ; Design of simple beams.
	R20C202.4	Appraise slope & deflection in beams of different cross sections and end conditions for various types of loading using different methods
	R20C202.5	Demonstrate stresses and strains in Thin & Thick Cylinders and Spherical shells.
II-I FLUID MECHANICS R20C203	R20C203.1	Define Physical properties of fluids, Derive Pascals& Hydrostatic laws & Estimate pressure. Derive & Estimate Hydrostatic pressures.
	R20C203.2	Classify the Fluid Flow, , Evaluate Velocity components by applying velocity potential & Stream functions. Estimate pressure by applying Euler's, Bernoulli's& Impulse momentum equations on pipe bends.
	R20C203.3	Define Laminar & Turbulent flows, Estimate Major & Minor losses, TEL & HGL &Moody's chart. Design of pipe networks.
	R20C203.4	Estimate the discharge and velocity by using Venturi meter, Orifice meter & Pitot tube in Pipe flows, Notches & Weirs across canals.

	R20C203.5	Evaluate Boundary layer thickness, Derive Vonkarmen momentum integral equation, Estimate Drag & Lift forces on submerged bodies.
II-I SURVEYING AND GEOMETRICS R20C204	R20C204.1	Illustrate the Principles, classification of Surveying and Calculate distances and angles.
	R20C204.2	Identify data collection methods and Evaluating the area of boundaries and volumes of earthwork by various methods.
	R20C204.3	Summarize the working of Theodolite by using trigonometric leveling and Analyze the Omitted Measurements in Traversing.
	R20C204.4	Define types of curves and their necessity, tacheometry and Identify the importance of E.D.M Total station and GPS.
	R20C204.5	Interpret survey data and compute areas and volumes.
II-I HIGHWAY ENGINEERING R20C205	R20C205.1	Acquire knowledge on the history and development of highways
	R20C205.2	Understand the planning of highways and determine the highway alignment
	R20C205.3	Design geometric elements of a highway network by having insight into different aspects of geometric elements
	R20C205.4	Design intersections and prepare traffic management plans.
	R20C205.5	Evaluate the engineering properties of the highway materials and judge the suitability of the same for pavement construction.
	R20C205.6	Design the flexible and rigid pavements
II-I CONCRETE TECHNOLOGY LAB R20C206	R20C206.1	Determine properties of cement
	R20C206.2	Assess properties of aggregates
	R20C206.3	Test properties of concrete in fresh state
	R20C206.4	Determine properties of concrete in hardened state
II-I HIGHWAY ENGINEERING LAB R20C207	R20C207.1	Test aggregates and judge the suitability of aggregates for the road construction
	R20C207.2	Test the given bitumen samples and judge their suitability for the road construction
	R20C207.3	Demonstrate the optimum bitumen content for the mix design
	R20C207.4	Determine the traffic volume, speed and parking characteristics and design rotary intersection
	R20C207.5	Draw road cross-section, do Earth work calculations
II-I SURVEY FIELD WORK R20C208	R20C208.1	Experiment the chain surveying in the field of civil engineering applications such as road profile & Area calculations.
	R20C208.2	Apply the principle of compass surveying for distance and angle measurement.
	R20C208.3	Sketch the plan of site.

	R20C208.4	Evaluate the R.L of unknown point and draw the longitudinal & contours.
II-I R20C209 SKILL ORIENTED COURSE	R20C209 .1	Design a brick wall with calculation of quantities of various ingredients a brick wall is made up of.
II-II COMPLEX VARIABLES AND STATISTICAL METHODS R20C211	R20C211.1	Apply Cauchy Riemann equations to find derivatives and integrals of complex function.
	R20C211.2	Write analytic function in power series and integrate complex function using Residue theorem.
	R20C211.3	Apply discrete and continuous probability distributions in calculating probabilities.
	R20C211.4	Apply Sampling techniques to give estimates of the population.
	R20C211.5	Test the hypothesis based on small and large sample tests.
II-II STRENGTH OF MATERIALS-II R20C212	R20C212.1	Appraise Principal stresses & Strains analytically, Graphically & Examine Theories of Failures.
	R20C212.2	Evaluate Shear stress, Torque & Power of circular shafts by using Torsional equation & Deflections of various types of Springs.
	R20C212.3	Examine the Crippling & Safe loads using Euler's & Rankine's theories for the columns with different end conditions & Laterally loaded struts.
	R20C212.4	Appraise the stresses for the column under eccentric loads, Dams, Chimneys & Retaining walls & check the stability of structures.
	R20C212.5	Evaluate Moments of inertia, Stresses & Deflection of beams subjected to unsymmetrical bending.
II-II HYDRAULICS AND HYDRAULIC MACHINERY R20C213	R20C213.1	Analyze uniform flow in open channels.
	R20C213.2	Analyze non-uniform flow in open channels.
	R20C213.3	Apply the principles of dimensional analysis and similitude in hydraulic models.
	R20C213.4	Apply momentum principle on hydraulic turbo machinery.
	R20C213.5	Evaluation of the working principles of various hydraulic machinery.
II-II ENVIRONMENTAL ENGINEERING R20C214	R20C214.1	Select a source based on quality and quantity and estimate design population and water demands.
	R20C214.2	Design a water treatment plant for a village/city.
	R20C214.3	Design a sewer by estimating DWF and Storm water flow and plumbing system for buildings.
	R20C214.4	Design a sewage treatment plant for a town/city.
	R20C214.5	Plan and design sewage disposal system for a town.
II-II	R20C215.1	Analyze the concept of managerial economics, Demand function, different methods of demand forecasting.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS R20C215	R20C215.2	Discuss the concepts of production function , economies of scale, optimum size of the firm, cost & break even analysis
	R20C215.3	Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles.
	R20C215.4	Prepare financial statements for analysis by using accounting tools.
	R20C215.5	Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business.
II-II ENVIRONMENTAL ENGINEERING LAB R20C216	R20C216.1	Evaluate water quality based on chemical analysis of given water or waste water samples.
	R20C216.2	Evaluate water quality based on physical/biological analysis of given water and waste water samples.
II-II STRENGTH OF MATERIAL LAB R20C217	R20C217.1	Determine Ultimate Tensile, Shear, Compressive & Impact strength of the given Specimen.
	R20C217.2	Determine the Deflection, Youngs Modulus & validation of Maxwells reciprocal theorem.
	R20C217.3	Determine the Shear Modulus for the Springs & Shafts.
	R20C217.4	Determine the Surface Hardness of the given material.
II-II FLUID MECHANICS AND HYDRAULICS MACHINERY LAB R20C218	R20C218.1	Determine various coefficients by using different equipment's.
	R20C218.2	Determine efficiencies of various turbines & pumps.
	R20C218.3	Verify Hydraulic jump and Bernoulli's Equation.
II-II SKILL ORIENTED R20C219	R20C219.1	Inspect Environment audit or Road safety audit or water leakage

III-I & III-II Courses

COURSE CODE	CO NUMBER	COURSE OUTCOME
III-I STRUCTURAL ANALYSIS R20C301	R20C301.1	Evaluate Shear force, bending moment and deflection of propped cantilever beams and Fixed beams subjected to various types of loadings.
	R20C301.2	Formulate Slope deflection equation for continuous beams, and Evaluate Shear force and bending moment of continuous beams and frames with and without settlement of supports using Slope Deflection Method and Moment Distribution Method.
	R20C301.3	Evaluate forces in members of Plane Pin-jointed perfect Trusses by using method of joints, method of sections and Method of Tension coefficients.

	R20C301.4	Examine loads in Pratt and Warren trusses when loads of different types and spans were passing over the truss.
	R20C301.5	Appraise Beams using Matrix Methods.
III-I DESIGN AND DRAWING OF REINFORCED R20C302	R20C302.1	Work on Working Stress Method and Limit State Method design philosophies
	R20C302.2	Carryout analysis and design of singly and doubly reinforced flexural members
	R20C302.3	Design the One-way and Two-way slabs
	R20C302.4	Design different types of compression members
	R20C302.5	Design the isolated footing
III-I GEOTECHNICAL ENGINEERING- I R20C303	R20C303.1	Describe the concepts of soil, soil structures, clay mineralogy for establishing inter-relationships between mass, volume and density and Acquire the concept of determining the various index properties of the soils and classification of soils
	R20C303.2	Identify the importance of permeability, seepage and effective stress concepts
	R20C303.3	Estimate the stress distribution in soil for various shapes of loading
	R20C303.4	Recognize the importance of the engineering properties of soil and determining them in laboratory
	R20C303.5	Determine the shear parameters of soil and its importance to find out the shear strength of a soil
III-I OBJECT ORIENTED PROGRAMING THROUGH JAVA R20C304	R20C304.1	Comprehending object oriented concepts and java program structure and its installation.
	R20C304.2	Remembering programming constructs, control structures in Java.
	R20C304.3	Evaluating Object oriented constructs such as various class hierarchies, interfaces and exception handling.
	R20C304.4	Analyzing Threads and I/O in Java.
	R20C304.5	Applying applets and Event handling , Java AWT and Java Swings.
III-I CONSTRUCTION TECHNOLOGY AND MANAGEMENT R20C305A	R20C305A .1	Value the importance of construction planning by using various network analysis techniques.
	R20C305A .2	Evaluate PERT, cost analysis, crashing of optimum cost and resources.
	R20C305A .3	Apply the functioning of various earth moving equipment's by their types.
	R20C305A .4	Classify the functioning of various earthwork equipment's.
	R20C305A.5	Apply the gained knowledge to construction techniques and safety.
III-I SURVEY CAMP FIELD WORK R20C306	R20C306.1	Experiment the method of Theodolite survey to calculate Distances & Areas.
	R20C306.2	Design & setting out of Curve by linear methods.
	R20C306.3	Sketch the Contour plan of an area using level
	R20C306.4	Experiment of angles, heights & distances using Total station.

III-I GEOTECHNICAL ENGINEERING LAB R20C307	R20C307.1	To impart knowledge of determination of index properties required for classification of soils
	R20C307.2	To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine the permeability of soils
	R20C307.3	To teach how to determine shear parameters of soil through different laboratory tests
III-I SKILL ADVANCED COURSE R20C308	R20C308.1	Equipping students with the professional knowledge in the design and construction of Industrial chimneys and Water tanks.
	R20C308.2	To get the professional knowledge in the design of service reservoir and Estimation of drains for village
	R20C308.3	To understand the design of spillway for low and medium height dams
	R20C308.4	To estimate the concrete roads and rain water harvesting ponds
III-I SUMMER INTERNSHIP R20C310	R20C310.1	Rapidly become certified Engineer Interns (EI) and Associate Constructors (AC) employed in civil engineering, construction, or related fields or pursuing graduate or professional education in engineering.
	R20C310.2	Become licensed Professional Engineers (PE) and/or Certified Professional Constructors (CPC) after gaining the required professional experience and the requisite knowledge to pass the licensing and/or certification exams.
	R20C310.3	Engage in lifelong learning, through on-the-job training, participation in professional societies, additional formal education, continuing education and professional development, research, and self-study, in order to use state-of-the-art knowledge to design and build safe and effective buildings and infrastructure and/or provide high quality service to the general public, employers, clients, and other professionals.
III-II DESIGN AND DRAWING OF STEEL STRUCTURES R20C311	R20C311.1	Design bolted and welded connections.
	R20C311.2	Design steel members using plastic analysis.
	R20C311.3	Design Tension and Compression steel members using limit state method.
	R20C311.4	Design Column Foundations with Gusseted base, Column base etc.
	R20C311.5	Design Plate Girder using IS code Provisions.
III-II WATER RESOURCE ENGINEERINGR R20C312	R20C312.1	Have a thorough understanding of the theories and principles governing the hydrologic processes.
	R20C312.2	Be able to quantify hydrologic components and apply concepts in hydrologic design of water resources projects.
	R20C312.3	Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
	R20C312.4	Develop design storms and carry out frequency analysis. Develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects.

	R20C312.5	Develop unit hydrograph and synthetic hydrograph.
III-II GEOTECHNICAL ENGINEERING- II R20C313	R20C313.1	Analyzing the stability of finite and infinite slopes in different conditions.
	R20C313.2	Usage of earth pressure theories for understanding the behavior of earth retaining structures.
	R20C313.3	Estimate the bearing capacity of the shallow foundation by various methods.
	R20C313.4	Estimate the load-carrying capacity of individual and group of piles.
	R20C313.5	Analyze the components of Well foundation.
III-II TRAFFIC ENGINEERING R20C315D	R20C315D .1	Learn the various components and characteristics of traffic.
	R20C315D .2	Learn the Microscopic and macroscopic characteristics.
	R20C315D .3	Learn the various traffic control devices and principles of highway safety.
	R20C315D .4	Understand the detrimental effects of traffic on environment.
	R20C315D .5	Understand the Highway Capacity and Level of Service.
III-II PYTHON PROGRAMMING R20C316A	R20C316A .1	Develop essential programming skills like data types, decision structures.
	R20C316A.2	Apply control statements and strings in Python
	R20C316A .3	Build standard programming constructs using functions, modules, and packages
	R20C316A .4	Apply operations on files, and object oriented concepts using case studies.
	R20C316A .5	Develop a graphical user interface and Error handling exceptions
III-II ESTIMATING SPECIFICATIONS AND CONTRACTS R20C317	R20C317.1	Discuss the conditions of contract and value the property.
	R20C317.2	Recognize the General items and the standard units of works
	R20C317.3	Evaluate the earthwork for roads & canals and recognize the concept of bar bending schedule.
	R20C317.4	Evaluate the rates for construction items
	R20C317.5	Estimate the quantities and cost of a building using individual wall method. centre line method.
III-II GIS AND CAD LAB R20C318	R20C318.1	Work comfortably on GIS software.
	R20C318.2	Digitize and create thematic map and extract important features.
	R20C318.3	Develop digital elevation model.
	R20C318.4	Interpretation and Estimation of features from satellite imagery.
	R20C318.5	Analyze and Modelling using GIS software.
III-II CIVIL ENGINEERING	R20C319.1	Understands the duties, responsibilities and codal practices of Civil Engineering profession.
	R20C319.2	Confident to work as a consulting engineer in any field of Civil Engineering.
	R20C319.3	Analyse and estimate environmental impact of civil projects.

PRACTICE R20C319	R20C319.4	Optimize project costs using sustainability concepts.
	R20C319.5	Plan, design and execute Civil Engineering projects.
III-II SKILL ADVANCED COURSE R20C320	R20C320.1	Analyze & Design the concrete beams, using structural analysis software.
	R20C320.2	Analyze & Design the concrete frames & Special Structures using structural analysis software.
	R20C320.3	Analyze & Design the steel structures using structural analysis software.
	R20C320.4	Detailing beams, slabs & Steel built up using Drawing software.
III-II EMPLOYABILITY SKILLS R20C321	R20C321.1	Solve aptitude and reasoning problems.
	R20C321.2	Apply the soft skills in dealing the issues related to employability.
	R20C321.3	Successful in getting employment in campus placements.
IV-I & IV-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
IV-I DESIGN AND DRAWING OF STEEL STRUCTURES R19C401	R19C401.1	Design bolted and welded connections
	R19C401.2	Design steel members using plastic analysis
	R19C401.3	Design Tension and Compression steel members using limit state method
	R19C401.4	Design Column Foundations with Gusseted base, Column base etc.
	R19C401.5	Design Plate Girder using IS code Provisions
[IV-I] GEOTECHNICAL ENGINEERING- II R19C402	R19C402.1	Analyzing the stability of finite and infinite slopes in different conditions.
	R19C402.2	Usage of earth pressure theories for understanding the behavior of earth retaining structures.
	R19C402.3	Estimate the bearing capacity of the shallow foundation by various methods.
	R19C402.4	Estimate the load-carrying capacity of individual and group of piles
	R19C402.5	Analyze the components of Well foundation
IV-I REMOTE SENSING AND GIS APPLICATIONS R19C403	R19C403.1	Acquire physical principles of remote sensing.
	R19C403.2	recognize the visual interpretation processing, enhancement and classification.
	R19C403.3	obtain the concepts and components of GIS and different types of data representation models.
	R19C403.4	apply rs and gis in areas of agriculture forestry geology geomorphology and urban land area.
	R19C403.5	apply rs and gis in WRE.
IV-I INDUSTRIAL	R19C404B .1	Identify the quality and quantity of water for various industries and Advanced water
	R19C404B .2	Identify the quality and quantity of water for various industries and Advanced water

WASTE WATER TREATMENT R19C404B	R19C404B .3	Implementing the methods to reduce impacts of disposal of wasters into environment and CETPs
	R19C404B .4	Illustrate the methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods.
	R19C404B.5	Illustrate the methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods
IV-I ENVIRONMENTAL POLLUTION AND CONTROL R19C405B	R19C405B .1	Identify various Air and Noise pollution control methods and have knowledge on Ambient Air and Noise standards
	R19C405B .2	Select suitable treatment methods required for Industrial waste water management
	R19C405B .3	Acquire knowledge on various Sources, Characteristics and Disposal of Solid Waste and their management techniques
	R19C405B .4	Specify the environmental sanitation methods and the management of community facilities without spread of epidemics
	R19C405B .5	State the importance of Sustainable Development while planning a project or executing an activity
IV-I GIS AND CAD LAB R19C406	R19C406.1	To Prepare the Spatial database from toposheet and satellite images.
	R19C406.2	To Prepare and map the surface elevation from the isoheights or isolines.
	R19C406.3	To apply Remote Sensing and GIS in National Resource Management.
[IV-I] GEOTECHNICAL ENGINEERING LAB R19C407	R19C407.1	Determine Index Properties Of Soil And Classify Them.
	R19C407.2	Determine Permeability Of Soils.
	R19C407.3	Determine Compaction, Consolidation And Shear Strength Characteristics
IV-I INTERNSHIP R19C408	R19C408.1	Understand work proceedings in the domain of civil engineering related projects.
	R19C408.2	Render solutions for the problems associated with the internship work.
IV-I PROJECT WORK PHASE -1 R19C409	R19C409.1	Identify the problem and develop its requirements and objectives.
	R19C409.2	Understand the literature related to the project.
	R19C409.3	Apply methodologies for the related topic.
	R19C409.4	Analyze the results obtained from the execution of work.
	R19C409.5	Able to draw summary and conclusions regarding the work.
[VI-II] ESTIMATING	R19C410.1	Recognize the General items and the standard units of works.
	R19C410.1	Value the rates for construction items.

SPECIFICATIONS AND CONTRACTS R19C410	R19C410.3	Evaluate the earthwork for roads & canals and recognize the concept of bar bending schedule.
	R19C410.4	Discuss the conditions of contract and value the property.
	R19C410.5	Estimate the quantities and cost of a building using individual wall and center line method.
IV-II DISASTER MANAGEMENT AND MITIGATION R19C411E	R19C411E .1	Understand the Definitions and Terminologies in Disaster Management Concepts.
	R19C411E .2	Discuss the classification of disasters.
	R19C411E .3	Discuss the Impacts of disasters.
	R19C411E .4	Understand the disaster risk reduction management programmes.
	R19C411E .5	Discuss the Impacts on disasters and environmental development.
[IV-II] GROUND IMPROVEMENT TECHNIQUES R19C412C	R19C412C .1	Select the Suitable densification methods for improving the properties of remolded and in-situ soils.
	R19C412C .2	Identify the suitable dewatering methods for improving properties of in-situ soils.
	R19C412C .3	Select the suitable admixtures to improve properties of unstable soil & Acquire knowledge on Grouting methods, techniques, test procedures & applications in various Civil Engineering structures.
	R19C412C .4	Design the reinforced earth wall, nailing by checking its stability.
	R19C412C .5	Recognize the suitable Geosynthetic materials (Geotextile, Geogrids, Geomembrane, Gabion) for improving the properties of soil.
IV-II PROJECT R19C413	R19C413.1	Identify the problem and develop its requirements and objectives.
	R19C413.2	Understand the literature related to the project.
	R19C413.3	Apply methodologies for the related topic.
	R19C413.4	Analyze the results obtained from the execution of work.
	R19C413.5	Able to draw summary and conclusions regarding the work.

Department of Electrical and Electronics Engineering

I-I & I-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C101 COMMUNICATIVE ENGLISH	R20C101.1	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
	R20C101.2	Form sentences using proper grammatical structures and correct word forms.

	R20C101.3	Recognize paragraph structure and be able to match beginnings, endings and headings with paragraphs.
	R20C101.4	Assess social, cultural and environmental issues with a scientific point of view.
R20C102 MATHEMATICS - I	R20C102.1	Test the convergence of an infinite series
	R20C102.2	Apply ODE of first Order and first Degree to various engineering fields.
	R20C102.3	Apply Linear Differential Equations of higher order with constant coefficients to various engineering fields.
	R20C102.4	Utilize Partial differentiation in optimization of functions of several variables
	R20C102.5	Apply Double and Triple integration techniques in evaluating areas and volumes of bounded regions
R20C103 MATHEMATICS - II	R20C103.1	Develop matrix techniques to find Eigen values and Eigen vectors of matrices.
	R20C103.2	Apply Eigen values and Eigen vectors to reduce a quadratic form to canonical form by orthogonal transformation, and to singular value decomposition of a matrix
	R20C103.3	Apply iterative methods to solve algebraic equation/transcendental equation/system of linear equations.
	R20C103.4	Interpolate data using various interpolating techniques
	R20C103.5	Apply numerical techniques to find derivatives/ to evaluate definite integral /to solve initial value problem of first order-first degree ODE.
R20C104 PROGRAMMING FOR PROBLEM SOLVING USING C	R20C104.1	Practice fundamentals of C programming language with tokens to write solutions for problems
	R20C104.2	Use different operators, control statements to write programs that use selection and loop constructs.
	R20C104.3	Apply concepts like arrays, strings, structures, and unions
	R20C104.4	Analyze pointers concepts with different pointer applications.
	R20C104.5	Illustrate writing programs with functions and concepts of File I/O.
R20C105 ENGINEERING DRAWING & DESIGN	R20C105.1	Constructing regular polygons by general methods ,Curves: Parabola, Ellipse and Hyperbola ,cycloids, involutes, Scales:Plain scales, diagonal scales and vernier scales.
	R20C105.2	Orthographic Projections: Projections of points , Projections of straight lines parallel to both the planes, line parallel to one plane and inclined to other plane. inclined to both the planes, determination of true lengths, angle of inclination and traces.
	R20C105.3	Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.
	R20C105.4	Projections of Solids :Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the planes.
	R20C105.5	Conversion of isometric views to orthographic views Conversion of orthographic views to isometric views.

R20C106 ENGLISH COMMUNICATION SKILLS LABORATORY	R20C106.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C106.2	Speak fluently by practising accent, rhythm and intonation.
	R20C106.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.
	R20C106.4	Employ suitable reading strategies to get the general idea of a text and draft reports.
R20C107 ELECTRICAL ENGINEERING WORKSHOP	R20C107.1	Illustrate the various electrical tools, symbols ,cables, switches, fuses, resistors, capacitors, MI,MC, Induction type meters.
	R20C107.2	Perform the different wiring circuits
	R20C107.3	Measure the voltage, Current, Power in D.C systems
	R20C107.4	Identification of types of earthing systems, Semi-conductor devices, Soldering & De-soldering Practice.
R20C108 PROGRAMMING FOR PROBLEM SOLVING USING C LAB	R20C108.1	Gains knowledge on various concepts of a C language
	R20C108.2	Design and development of C problem solving skills
	R20C108.3	Design and develop modular programming skills
R20C109 MATHEMATICS-III	R20C109.1	Interpret the physical meaning of different operators such as gradient, curl and divergence and find the work done against a field, circulation and flux. using vector calculus
	R20C109.2	Apply the Laplace transform for solving Initial value problems.
	R20C109.3	Compute the Fourier series of periodic signals and applying integral expressions for the forward and inverse Fourier transforms.
	R20C109.4	Form PDEs and solve first order PDEs.
	R20C109.5	Identify solution methods for PDEs of higher order that model physical processes.
R20C110 APPLIED PHYSICS	R20C110.1	Distinguish the phenomena of light- Interference, diffraction, polarization and determine the wavelength of given light using these phenomena.
	R20C110.2	Apply the concepts of light in optical fiber and lasers in communication system.
	R20C110.3	Calculate the energy of quantum particle at different energy levels and differentiate solids based on the band theory.
	R20C110.4	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications
	R20C110.5	Classify the semiconductors and study the properties of superconductors.
R20C111	R20C111.1	Apply Algorithm for solving problems like searching and sorting
	R20C111.2	Identify the representation and various operations on linked lists

DATA STRUCTURES THROUGH C	R20C111.3	Examine the concepts of stack and queues for the given specific application using arrays and linked lists
	R20C111.4	Examine the concepts of stack and queues for the given specific application using arrays and linked lists
	R20C111.5	Examine the properties and apply operations on binary trees and Binary search trees
R20C112 ELECTRICAL CIRCUIT ANALYSIS -I	R20C112.1	Apply techniques to electrical circuits consisting of passive elements for DC excitation
	R20C112.2	Analyse basic concepts of Magnetic circuits
	R20C112.3	Analyse the basic concepts of Single phase AC Systems
	R20C112.4	Analyse R, L, network with variation of any one of the parameters i.e., R, L, C and f
	R20C112.5	Examine the parameters of AC and DC networks using Theorems
R20C113 BASIC CIVIL AND MECHANICAL ENGINEERING	R20C113.1	Sketch Shear force diagram & Bending moment diagram principles for Cantilever and Simply supported beams
	R20C113.2	Apply concepts of Rosette analysis for strain measurements
	R20C113.3	Identify the characteristics of common building materials
	R20C113.4	Compare the working characteristics of Internal Combustion engines.
	R20C113.5	Compare the differences between boiler mountings and accessories.
R20C114 APPLIED PHYSICS LAB	R20C114.1	Examine the physical properties of light using interference and diffraction.
	R20C114.2	Calculate the numerical aperture and acceptance angle of optical fiber
	R20C114.3	Analyze the characteristics of semiconducting materials
	R20C114.4	Demonstrate the magnetizing behaviour of magnetic materials
	R20C114.5	Calculate the dielectric constant of a material
R20C115 BASIC CIVIL AND MECHANICAL ENGINEERING LAB	R20C115.1	Solve to arrive at finding constant speed and variable speed on IC engines and interpret their performance
	R20C115.2	Estimate energy distribution by conducting heat balance test on IC engines
	R20C115.3	Explain the procedure for the standardization of experiments.
	R20C115.4	Determine flow discharge measuring device used in pipes channels and tanks.
	R20C115.5	Determine fluid and flow properties.
	R20C115.6	Test for the performance of pumps and turbines
R20C116 DATA STRUCTURES THROUGH C LAB	R20C116.1	Apply different sorting and searching algorithms
	R20C116.2	Apply different operation on data structures like arrays, linked lists, stacks and queues, Trees

R20C117 CONSTITUTION OF INDIA	R20C117.1	Understand the History and features of Indian constitution
	R20C117.2	Explain the roles of President and Prime Minister, Structure of supreme court and High court
	R20C117.3	Discuss the structure and functions of state secretariat
	R20C117.4	Describe Zillapanchayat block level organisation
	R20C117.5	Explain the roles of Election Commission, SC/ST/OBC and women commissions
II-I & II-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C201 MATHEMATICS IV	R20C201.1	Apply Cauchy Riemann equations to find derivatives and integrals of complex function
	R20C201.2	Write analytic function in power series and integrate complex function using Residue theorem.
	R20C201.3	Apply discrete and continuous probability distributions in calculating probabilities.
	R20C201.4	Apply Sampling techniques to give estimates of the population.
	R20C201.5	Test the hypothesis based on small and large sample tests.
R20C202 ELECTRONIC DEVICES AND CIRCUITS	R20C202.1	Outline the basic concepts of semiconductor physics.
	R20C202.2	Analyze the operation and characteristics of diodes.
	R20C202.3	Demonstrate the operation and design aspects of rectifiers and regulators.
	R20C202.4	Differentiate the characteristics of CB,CE,CC transistor configurations and biasing techniques.
	R20C202.5	Differentiate the characteristics of CB,CE,CC transistor configurations and biasing techniques.
	R20C202.6	Illustrate the role of feedback in amplifiers and oscillators.
R20C203 ELECTRICAL CIRCUIT ANALYSIS II	R20C203.1	Analyze three phase circuits under balanced and unbalanced conditions
	R20C203.2	Calculate transient response of electrical networks with AC and DC excitations
	R20C203.3	Estimate two port network parameters which includes Z,Y,ABCD,H and G
	R20C203.4	Design as electrical network for a given transfer function
	R20C203.5	Apply Fourier transforms to an electric network to extract harmonics
R20C204 DC MACHINES AND TRANSFORMERS	R20C204.1	Explain the Principles of electromechanical energy conversion devices, construction and operation of DC machines and its classification.
	R20C204.2	Discuss the ill-effects of armature reaction, various characteristics and starting methods of DC machines and methods to improve commutation
	R20C204.3	Demonstrate various speed control methods and testing of DC machines.
	R20C204.4	Analyze the performance of single phase transformer and auto-transformer

	R20C204.5	Analyze various connections of three phase transformers
R20C205 ELECTRO MAGNETIC FIELDS	R20C205.1	Calculate electric fields and potentials using guass law or solving Laplace or passion equations
	R20C205.2	Evaluate the Maxwell's equations in different forms and the boundary conditions for fields across media interfaces
	R20C205.3	Calculate magnetic field intensity due to current, the application of amperes law and Maxwell second equation.
	R20C205.4	Evaluate the magnetic force and dipole moment in magnetic field
	R20C205.5	Analyze the Self, Mutual inductances , and energy densities in a magnetic materials
	R20C205.6	Evaluate Poynting vector and Maxwell equations for time varying fields
R20C206 ELECTRICAL CIRCUITS LAB	R20C206.1	Evaluate responses of networks by using Theorems
	R20C206.2	Calculate self , Mutual inductances of coupled circuits
	R20C206.3	Compute the parameters of Two Port Networks choke coil, electrical lamp
	R20C206.4	Calculate the three phase power for balanced and unbalanced loads
	R20C206.5	Estimate the performance of R-L, R-C and R-L-C circuits with variation of parameters
R20C207 DC MACHINES AND TRANSFORMERS LAB	R20C207.1	Analyze the characteristics and calculate the efficiency of DC shunt machine.
	R20C207.2	Analyze the performance of a transformer by conducting load and no load tests.
	R20C207.3	Distinguish various characteristics and test the efficiency of DC compound machine
	R20C207.4	Distinguish various characteristics and test the efficiency of DC SERIES machine.
R20C208 ELECTRONICS DEVICES AND CIRCUITS LAB	R20C208.1	obtain the knowledge in electrical and physical properties of basic components and equipment's
	R20C208.2	understand the VI characteristics of diodes
	R20C208.3	understand the basic application of diode and to design different types of rectifiers with and Without filter
	R20C208.4	Understanding the input output characteristics and to measure various device parameters
	R20C208.5	Measure the unknown signal parameters
	R20C208.6	Understanding the frequency response of amplifiers
R20C209 DESIGN OF ELECTRICAL CIRCUITS USING ENGINEERING SOFTWARE TOOLS	R20C209.1	write the MATLAB programs to simulate the electrical circuit problems
	R20C209.2	simulate various circuits for electrical parameters
	R20C209.3	simulate various wave form for determination of wave form parameters
	R20C209.4	simulate RLC series and parallel resonance circuits for resonant parameters
	R20C209.5	simulate magnetic circuits for determination of self and mutual inductances

R20C210 PROFESSIONAL ETHICS AND HUMAN VALUES	R20C210.1	Define the development of an ethical perspective towards life
	R20C210.2	Apply the principles of Harmony to learning
	R20C210.3	Describe appropriate technologies and apply professional code of ethics
	R20C210.4	Recognize and analyze the risk benefit analysis and adopt safety measures
	R20C210.5	Recall the professional responsibilities and rights to attain social harmony's.
	R20C210.6	Identify ethical concerns in research and intellectual contexts and to be aware about contemporary global issues.
R20C211 PYTHON PROGRAMMING	R20C211.1	Develop basic programming skills like data types, decision structures
	R20C211.2	Apply control statements and strings in Python
	R20C211.3	Build standard programming constructs using functions, modules and packages
	R20C211.4	Demonstrate operations on files, object oriented concepts using case studies.
	R20C211.5	Develop graphical user interface and Apply testing in Python
R20C212 DIGITAL ELECTRONICS	R20C212.1	Describe the concepts of number systems, logic gates and codes
	R20C212.2	Evaluate the logic and switching functions using Boolean theorems and K maps
	R20C212.3	Design small combinational circuits to build more complex combinational circuits
	R20C212.4	Design various digital circuits using PLD's
	R20C212.5	Design and analyze both synchronous and Asynchronous sequential circuits for real time applications
	R20C212.6	Design the clocked sequential circuit for given parameters so as to minimize a digital circuit
R20C213 POWER SYSTEMS 1	R20C213.1	Illustrate components of thermal, Hydro & Nuclear power plants.
	R20C213.2	Distinguish the components of gas and air insulated substations.
	R20C213.3	Analyze the underground cables and Calculate insulation resistance and capacitance
	R20C213.4	identify the tariff methods and load curves
R20C214 INDUCTION AND SYNCHRONOUS MACHINES	R20C214.1	Explain about the operation of three phase induction motor by means of Rotating magnetic field theory and the constructional features of 3-phase induction motor and also its equivalent circuit and phasor diagram
	R20C214.2	Explain the torque-speed characteristics and analyze the complete performance of three phase induction motor.
	R20C214.3	Explain the operation and starting methods of single phase induction motors and also its performance in terms of equivalent circuit
	R20C214.4	Illustrate the winding design and predetermine the regulation of synchronous generators.

	R20C214.5	Operate synchronous generators in parallel
	R20C214.6	Apply methods for starting, hunting prevention and also correct the power factor with synchronous motor.
R20C215 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	R20C215.1	Analyze the concept of managerial economics, Demand function, different methods of demand forecasting.
	R20C215.2	Discuss the concepts of production function , economies of scale, optimum size of the firm, cost & break even analysis
	R20C215.3	Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles
	R20C215.4	Prepare financial statements for analysis by using accounting tools.
	R20C215.5	Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business
R20C216 PYTHON PROGRAMMING LAB	R20C216.1	Apply the basics of programming in the Python language.
	R20C216.2	Apply lists, tuples and dictionaries for solving compound data using functions.
	R20C216.3	Apply the fundamental notions and techniques used in object- oriented programming
R20C217 INDUCTION AND SYNCHRONOUS MACHINES LAB	R20C217.1	Examine the performance characteristics of three phase induction machines
	R20C217.2	Distinguish various characteristics and test the efficiency and regulation of synchronous machines
	R20C217.3	Determine the performance of a single phase induction motors
R20C218 DIGITAL ELECTRONICS LAB	R20C218.1	Examine the functionality of logic gates
	R20C218.2	Design combinational circuits using logic gates and verify the functionality of combinational circuits available in IC form
	R20C218.3	Design sequential circuits using logic gates and flip flop
R20C219 IOT APPLICATIONS OF ELECTRICAL ENGINEERING	R20C219.1	Apply various technologies of Internet of Things for Electrical Engineering Applications
III-I & III-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C301 POWER SYSTEMS II	R20C301.1	compute the parameters of various types of transmission lines during different operating conditions
	R20C301.2	Analyze the performance of short and medium transmission lines

	R20C301.3	Explain performance of Long Transmission lines
	R20C301.4	Discuss the power system transients
	R20C301.5	Illustrate various factors related to charged Transmission lines
	R20C301.6	Determine sag/tension of transmission lines and performance of line insulators
R20C302 POWER ELECTRONICS	R20C302.1	Explain the characteristics of various power semiconductor device, operation of diode bridge rectifier and firing circuits for SCR
	R20C302.2	Analyze the single phase converters and three phase converters
	R20C302.3	Discriminate the single phase dc-dc converters
	R20C302.4	Apply PWM Techniques for dc-dc converters
	R20C302.5	Analyze the operation of AC-AC regulators
R20C303 CONTROL SYSTEMS	R20C303.1	Calculate the transfer function of physical systems
	R20C303.2	Determine time response specifications of second order systems and error constants of linear systems.
	R20C303.3	Analyze stability of Linear time invariant systems using time domain analysis methods such as Routh? Stability criterion and the root locus method.
	R20C303.4	Analyze the stability of Linear time invariant systems using frequency response methods such as Nyquist, Bode and polar plots.
	R20C303.5	Design Lag, Lead, Lag-Lead compensators to improve system performance by using Bode diagrams.
	R20C303.6	Develop the state model equations and identify the controllability and observability of a physical system.
R20C306 CONTROL SYSTEMS LAB	R20C306.1	Analysis of P,PI,PID controllers with and without temperature effect
	R20C306.2	Design Lag, Lead, Lag-Lead Compensators
	R20C306.3	Analyze the Characteristics of synchro's, magnetic amplifiers , stepper motor, AC and DC servomotors
	R20C306.4	Calculate time domain specifications and stability of Linear invariant system
	R20C306.5	Determine transfer function and control of DC Servo Motor and DC generator
	R20C306.6	Demonstrate the function of potentiometers as error detector and analyze the system state space analysis using MATLAB
R20C307 POWER ELECTRONICS LAB	R20C307.1	Analyze Characteristics of IGBT, MOSFET, SCR , Firing and Commutation Circuits of SCR
	R20C307.2	Estimate the performance of converters for resistive and inductive loads
	R20C307.3	Analyze the performance of AC voltage controller and cyclo converter with resistive and inductive loads
	R20C307.4	Examine the working of Buck Boost converter , Jones chopper

	R20C307.5	Examine the Single Phase Bridge and PWM inverter
R20C308 EMPLOYABILITY SKILLS	R20C308.1	Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
	R20C308.2	Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life
	R20C308.3	Analyze, summarize and present information in quantitative forms including table, graphs and formulas
	R20C308.4	Understand the core competencies to succeed in professional and personal life
	R20C308.5	Learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc.
R20C305B UTILIZATION OF ELECTRICAL ENERGY	R20C305B.1	Choose a suitable motor for electric drives and industrial applications.
	R20C305B.2	Recognize most appropriate heating or welding techniques for suitable applications.
	R20C305B.3	Describe the laws, measurement and sources of illumination
	R20C305B.4	Design of indoor, outdoor and flood lighting systems
	R20C305B.5	Analyze the speed/time characteristics of traction motors.
	R20C305B.6	Calculate energy consumption levels in various modes of operation.
R20C304F COMPUTER ORGANIZATION AND ARCHITECTURE	R20C304F.1	Explain the instruction cycle of a computer.
	R20C304F.2	Understand various micro operations and register transfer language
	R20C304F.3	Describe parallel processing and pipelining.
	R20C304F.4	Interface different peripherals with processors
	R20C304F.5	Know the advantages of cache and virtual memory.
R20C309 ENVIRONMENTAL SCIENCE	R20C309.1	Overall understanding of the natural resources
	R20C309.2	Basic understanding of the ecosystem and its diversity
	R20C309.3	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
	R20C309.4	An understanding of the environmental impact of developmental activities
	R20C309.5	Awareness on the social issues, environmental legislation and global treaties
R20C311 MICROPROCESSORS AND MICROCONTROLLERS	R20C311.1	Understand the functionality of 8086 microprocessor architecture and advanced processors.
	R20C311.2	Understand the various addressing modes, instruction set of 8086 and different modes of operation of 8086.
	R20C311.3	Develop interfacing circuitry for memory unit and other peripheral devices to the 8086 microprocessors.
	R20C311.4	Understand the basic concepts of 8051 & PIC microcontroller and its architecture.

	R20C311.5	Apply the concepts of programming in C on PIC microcontroller to solve simple problems.
R20C312 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	R20C312.1	Choose correct type of instrument to measure Voltage, Current, Power & Power Factor
	R20C312.2	Select suitable bridge for measurement of Electrical Parameters
	R20C312.3	Develop the knowledge of transducers and types
	R20C312.4	Predict Phase difference, Electrical parameters by Digital Meters
R20C313 POWER SYSTEM ANALYSIS	R20C313.1	Sketch the impedance diagram and form Ybus matrix for a power system network
	R20C313.2	Find out the load flow solution for a power system network using load flow methods
	R20C313.3	Formulate the Zbus for a power system network
	R20C313.4	Calculate the symmetrical fault currents
	R20C313.5	Analyze the sequence components of currents for any unbalanced power system network
	R20C313.6	Illustrate the steady state, transient and dynamic stability concepts of a power system
R20C314D SWITCHGEAR AND PROTECTION	R20C314D.1	Describe the construction, working of oil, SF ₆ , air, vacuum circuit breakers
	R20C314D.2	Discuss the operating principles of electromagnetic relays
	R20C314D.3	Choose the protection schemes for faults occurring in power systems
	R20C314D.4	Choose the protection schemes for faults occurring in power systems & Components of Static relays
	R20C314D.5	Understand the methods of protection against over voltages, grounding
R20C315F COMPUTER NETWORKS	R20C315F.1	To introduce the Fundamentals of data communication networks
	R20C315F.2	To demonstrate the Functions of various protocols of Data link layer
	R20C315F.3	To Classify medium access control protocols and Wired LAN's
	R20C315F.4	Distinguish the various functions of Network layer, Routing and IP addressing
R20C316 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB	R20C316.1	Calibrate Single phase energy meter, Wattmeter, PMMC Voltmeter by Crompton DC Potentiometer, LVDT
	R20C316.2	Measure the Resistance, Inductance, Capacitance using Bridges
	R20C316.3	Calculate the Power by 1-Wattmeter, 3 Voltmeter, 3 Ammeter
	R20C316.4	Test transformer oil for its effectiveness
R20C317 MICROPROCESSORS AND MICROCONTROLLERS LAB	R20C317.1	Determine the parameters of various power system components occur in power system studies
	R20C317.2	Design the frequency control of a system With and Without Controllers

R20C318 POWER SYSTEMS AND SIMULATION LAB	R20C318.1	Determine the parameters of various power system components occur in power system studies
	R20C318.2	Design the frequency control of a system With and Without Controllers
R20C319 SKILLADVANCED COURSE MACHINE LEARNING WITH PYTHON	R20C319.1	Illustrate and comprehend the basics of Machine Learning with Python
	R20C319.2	Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
	R20C319.3	Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
	R20C319.4	Evaluate the concepts of binning, pipeline Interfaces with examples
	R20C319.5	Apply the sentiment analysis for various case studies
IV-I & IV-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R19C401 SWITCHGEAR AND PROTECTION	R19C401.1	Describe the construction, working of oil, SF6, air, vacuum circuit breakers
	R19C401.2	Discuss the operating principles of electromagnetic relays
	R19C401.3	Choose the protection schemes for faults occurring in power systems -Alternators
	R19C401.4	Choose the protection schemes for faults occurring in power systems -Transformers
	R19C401.5	Explain the types of static relays
	R19C401.6	Understand the methods of protection against over voltages, grounding
R19C402 OOPS THROUGH JAVA	R19C402.1	Comprehending object oriented concepts and java program structure and its installation
	R19C402.2	Remembering programming constructs, control structures in Java
	R19C402.3	Evaluating Object oriented constructs such as various class hierarchies, interfaces and exception handling
	R19C402.4	Analyzing Threads and I/O in Java
	R19C402.5	Applying applets and Event handling , Java AWT and Java Swings
R19C403 RENEWABLE ENERGY SYSTEMS	R19C403.1	Analyze solar radiation data on earth's surface.
	R19C403.2	Design solar photo voltaic systems.
	R19C403.3	Develop maximum power point techniques in wind system
	R19C403.4	Illustrate the working principle of Hydro and tidal power systems
	R19C403.5	Explain the basic principle and working of biomass, fuel cell and geothermal systems

R19C404 UTILIZATION OF ELECTRICAL ENERGY	R19C404.1	Choose a suitable motor for electric drives and industrial applications.
	R19C404.2	Recognize most appropriate heating or welding techniques for suitable applications.
	R19C404.3	Describe the laws, measurement and sources of illumination
	R19C404.4	Design of indoor, outdoor and flood lighting systems
	R19C404.5	Analyze the speed/time characteristics of traction motors.
	R19C404.6	Calculate energy consumption levels in various modes of operation.
R19C405C HIGH VOLTAGE ENGINEERING	R19C405C.1	To acquaint with the performance of high voltages with regard to different configurations of electrode systems.
	R19C405C.2	Develop ability to understand theory of breakdown and withstand Phenomena of all types of dielectric materials.
	R19C405C.3	To acquaint with the techniques of generation of AC,DC and Impulse voltages.
	R19C405C.4	Emphasis the knowledge for measurement of high voltage and high current AC,DC and Impulse.
	R19C405C.5	Attain the knowledge To the techniques of testing various equipment's used in HV engineering.
R19C405D ENERGY AUDITING AND DEMAND SIDE MANAGEMENT	R19C405D.1	Explain energy efficiency , conservation and Energy Management
	R19C405D.2	Design energy efficient lighting systems
	R19C405D.3	Propose suitable compensation techniques for power factor improvement & explain about energy instrument
	R19C405D.4	Explain energy conservation in HVAC systems & Compute various Methods such as depreciation factor etc,
	R19C405D.5	Compute life cycle costing on energy efficient Management
R19C406 LINEAR AND DIGITAL IC APPLICATIONS LABORATORY	R19C406.1	understand the characteristics of ICs-741, 555, 565, 566.
	R19C406.2	apply the concepts of IC 741 for different applications
	R19C406.3	analyse the data connection circuits.
	R19C406.4	develop the digital circuits.
	R19C406.5	model the counters & Registers using IC's.
R19C407 POWER SYSTEMS AND SIMULATION LABORATORY	R19C407.1	Determine the parameters of various power system components occur in power system studies
	R19C407.2	Design the frequency control of a system With and Without Controllers
	R19C407.3	Test the operating characteristics of Relays
R19C409 PROJECT I	R19C409.1	Identifies the problem through Literature survey.
	R19C409.2	Selects an appropriate tool/design procedure to overcome the problem.

	R19C409.3	Analyses the data, evaluates the problem and critically assess the results.
	R19C409.4	Identifies the process of simulation, fabrication / manufacturing and develops a model.
	R19C409.5	Summarises the results and documents the work as a technical report.
R19C410 POWER SYSTEM OPERATION AND CONTROL	R19C410.1	compute optimal scheduling of Generators
	R19C410.2	understand hydrothermal scheduling.
	R19C410.3	understand the unit commitment problem
	R19C410.4	understand importance of the frequency
	R19C410.5	understand importance of PID controllers in single area and two area systems.
	R19C410.6	understand reactive power control and compensation for transmission line.
R19C411 PROBLEM SOLVING USING PYTHON	R19C411.1	Develop essential programming skills like data types, decision structures
	R19C411.2	Apply control statements and strings in Python
	R19C411.3	Build standard programming constructs using functions, modules, and packages
	R19C411.4	Apply operations on files, object oriented concepts using case studies.
	R19C411.5	Develop graphical user interface and Error handling exceptions
R19C411A ELECTRICAL DISTRIBUTION SYSTEMS	R19C411A.1	understand various factors of distribution system.
	R19C411A.2	design the substation and feeders.
	R19C411A.3	determine the voltage drop and power loss
	R19C411A.4	understand the protection and its coordination
	R19C411A.5	understand the effect of compensation for p.f improvement.
	R19C411A.6	understand the effect of voltage control.
R19C411C FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS	R19C411C.1	understand power flow control in transmission lines using FACTS controllers.
	R19C411C.2	explain operation and control of voltage source converter
	R19C411C.3	analyze compensation methods to improve stability and reduce power oscillations in the transmission lines.
	R19C411C.4	explain the method of shunt compensation using static VAR compensators
	R19C411C.5	understand the methods of compensations using series compensators
	R19C411C.6	explain operation of Unified Power Flow Controller (UPFC).
R19C412 PROJECT II	R19C412.1	PROJECT II

Department of Mechanical Engineering

COURSE CODE	CO NUMBER	COURSE OUTCOME
I-I R20C101 Calculus & Differential Equations (M-I)	R20C101.1	Test the convergence of an Infinite Series.
	R20C101.2	Apply ODE of first Order and first Degree to various engineering fields.
	R20C101.3	Apply Linear Differential Equations of higher order with constant coefficients to various engineering fields.
	R20C101.4	Utilize Partial differentiation in optimization of functions of several variables.
	R20C101.5	Apply Double and Triple integration techniques in evaluating areas and volumes of bounded regions.
I-I R20C102 Engineering Physics	R20C102.1	Distinguish the phenomena of light- Interference, diffraction, polarization and determine the wavelength of given light using these phenomena.
	R20C102.2	Apply the concepts of light in optical fiber and lasers in communication system.
	R20C102.3	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications
	R20C102.4	Apply flaw detection techniques using ultrasonics and describe the acoustic quality of concert hall
	R20C102.5	Analyze the crystalline structure by Bragg's X-ray diffractometer
I-I R20C103 Programming for Problem Solving	R20C103.1	Understand the basic concepts of C Programming such as algorithms, flowchart, data types, and their declaration, identifiers, operators, number system and C programming structure.
	R20C103.2	Apply knowledge of different operators, & conditional or unconditional statements to solve problems using c programs.
	R20C103.3	Analyze name and space complexity among the usage of variables, arrays and pointer concepts
	R20C103.4	Classify user defined, pre defined functions, structure and union by applying with and without pointers.
	R20C103.5	Measure different memory allocation and utilization techniques with respective variables, array, structure, union, files
I-I R20C104 Communicative English	R20C104.1	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
	R20C104.2	Form sentences using proper grammatical structures and correct word forms.
	R20C104.3	Recognize paragraph structure and be able to match beginnings, endings and headings with paragraphs.
	R20C104.4	Assess social, cultural and environmental issues with a scientific point of view.
I-I R20C105	R20C105.1	Draw regular polygons and Engineering Curves(Ellipse, parabola, Hyperbola, Cycloids and involutes), Scale (Plain, Diagonal & Vernier Scale) by using drawing instruments and standards

Engineering Drawing	R20C105.2	Draw orthographic projections of the points and projections of lines parallel to one plane, inclined to one principle plane
	R20C105.3	Draw orthographic projections of lines inclined to both the planes
	R20C105.4	Draw Orthographic projections of planes (simple position and inclined to both the planes)
	R20C105.5	Draw Orthographic projections of Solids (simple position and inclined to both the planes)
	R20C105.6	visualize and draw engineering objects in 3D view through isometric views and convert isometric to orthographic and vice versa
I-I R20C106 Engineering Physics Lab	R20C106.1	Examine the physical properties of light using interference and diffraction.
	R20C106.2	Calculate the numerical aperture and acceptance angle of optical fiber
	R20C106.3	Calculate the rigidity modulus of the given material and measure the frequency of tuning fork using resonance method
	R20C106.4	Demonstrate the magnetizing behaviour of magnetic materials
	R20C106.5	Calculate the dielectric constant of a material
I-I R20C107 Programming for Problem Solving Using C Laboratory	R20C107.1	Gains Knowledge on various concepts of a C language. Able to draw flowcharts and write algorithms
	R20C107.2	design and development of C problem solving skills.
	R20C107.3	Develop and implement different types of arrays, strings, structures, and unions.
I-I R20C108 English Communication Skills Laboratory	R20C108.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C108.2	Speak fluently by practising accent, rhythm and intonation.
	R20C108.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.
	R20C108.4	Employ suitable reading strategies to get the general idea of a text and draft reports.
I-I R20C109 Environmental Science	R20C109.1	Identify environmental issues from an interdisciplinary perspective and regulation of ecosystems.
	R20C109.2	Focus on sustainable usage of natural resources in global concern.
	R20C109.3	Interpret the importance of biodiversity and maintain ecological balance
	R20C109.4	Categorize the various types of environmental pollution and their control methods.
	R20C109.5	Ascertain the environmental legislations to control the social issues and paraphrase the proposed methodologies for environmental management
I-II	R20C110.1	Develop matrix techniques to find Eigen values and Eigen vectors.

R20C110 Linear Algebra & Numerical Methods (M-II)	R20C110.2	Apply Eigen values and Eigen vectors to reduce a quadratic form to canonical form by orthogonal transformation, and to singular value decomposition of a matrix.
	R20C110.3	Apply iterative methods to solve algebraic equation/transcendental equation/system of linear equations.
	R20C110.4	Interpolate data using various interpolating techniques.
	R20C110.5	Apply numerical techniques to find derivatives/to evaluate integrals/to solve initial value problems of first order, first degree ODE.
I-II R20C111 Engineering Chemistry	R20C111.1	Elucidate polymerization techniques and identify suitable polymer material for a given engineering application.
	R20C111.2	Describe the working of primary cells, secondary cells and recognize control methods for standard types of corrosion.
	R20C111.3	Explicate characteristics, preparation methods and applications of materials (Nano materials, Refractories, Cement & Lubricants) with advanced techniques.
	R20C111.4	Estimate the calorific value, composition and flue gas analysis of solid, liquid and gaseous fuels.
	R20C111.5	Select the appropriate method of purification and softening by considering impurities or hardness present in water.
I-II R20C112 Engineering Mechanics	R20C112.1	Compute resultant of a forces in planer & spatial systems. Find out the Friction force in different cases
	R20C112.2	Analyze planar, spatial force systems with and without friction under static equilibrium by analytical & graphical method
	R20C112.3	Locate centroid and center of gravity of composite areas and composite bodies respectively
	R20C112.4	Compute area and mass moment of inertia of composite areas and composite bodies respectively
	R20C112.5	Analyze the motion of a body rectilinear& curvilinear motion in case of Kinematics and kinetics of rigid bodies in translation and rotation and plane motion by using principles of motion, Work-Energy Method, & Impulse momentum method.
I-II R20C113 Basic Electrical & Electronics Engineering	R20C113.1	Analyze resistive, inductive and capacitive networks
	R20C113.2	Analyze the performance of DC Machines
	R20C113.3	Analyze the performance of single phase transformer, 3-phase alternator and 3-phase induction motors
	R20C113.4	Describe the applications of diode and OP-AMP
	R20C113.5	Describe the characteristics and applications of Transistor
I-II R20C114 Thermodynamics	R20C114.1	Describe the concepts of continuum, system, properties, thermodynamic equilibrium, zeroth law of thermodynamics, temperature and its measurement.
	R20C114.2	Apply first law of thermodynamics to closed and open systems
	R20C114.3	Apply second law of thermodynamics to heat engines, heat pumps and analyze the concepts of Carnot cycle, entropy, availability, irreversibility and use Maxwell relations.

	R20C114.4	Evaluate properties of pure substances, use Mollier charts to various thermodynamic processes
	R20C114.5	Evaluation of properties of perfect gas mixtures.
I-II R20C115 Workshop Practice Lab	R20C115.1	Perform operations in carpentry with appropriate tools
	R20C115.2	Perform basic operations in fitting with appropriate tools
	R20C115.3	Develop prototypes with sheetmetals
	R20C115.4	Perform electrical connections required for house wiring
	R20C115.5	Mold the given object to desired size and shape through Blacksmithy
I-II R20C116 Engineering Chemistry Laboratory	R20C116.1	Handle Conductivity meter, Colorimeter, PH-meter and Potentiometer for analysis of materials using small quantities involved for quick and accurate results.
	R20C116.2	Carry out acid- base titrations for Standardization of acids and estimation of alkalinity present in the given samples.
	R20C116.3	Calculate the quantity of ferrous ion and Manganese ions by using redox titrations.
	R20C116.4	Perform quantitative interpretations of titration and be familiar with the concept of hardness, turbidity and total dissolved salts in water sample.
	R20C116.5	Demonstrate the chemistry of iodine as direct and indirect oxidizing agent.
I-II R20C117 Basic Electrical & Electronics Engineering Lab	R20C117.1	Evaluate the performance characteristics of D.C Motor
	R20C117.2	Design the equivalent parameters of 1-phase transformer
	R20C117.3	Predict the performance characteristics of 3-phase induction motor
	R20C117.4	Determine the regulation of an alternator using synchronous impedance method
	R20C117.5	Analyze the operation and application of diode in suitable modes.
I-II R20C118 Constitution of India	R20C118.1	Analyze the characteristics of transistor as amplifier, operational amplifier in different configurations.
	R20C118.2	Compare the roles of President and Prime Minister, Structure of Supreme court and High court.
	R20C118.3	Discuss the roles of Governor and CM besides the structure and functions of state secretariat.
	R20C118.4	Describe the structure and functions of Municipalities, Zillapanchayat and block level organization.
	R20C118.5	Identify the roles of Election Commission and the government authorities for the welfare of SC/ST/OBC and women.
II-I R20C201 Vector Calculus, Fourier Transforms and	R20C201.1	Find the workdone against a field, circulation and flux using vector calculus
	R20C201.2	Apply the Laplace transform for solving differential equations
	R20C201.3	Compute the Fourier series of periodic signals
	R20C201.4	Compute Fourier and inverse Fourier transform to a range of non-periodic waveforms

PDE(M-III)	R20C201.5	Form Partial Differential Equations and solve first order Partial Differential Equations
II-I R20C202 Mechanics of Solids	R20C202.1	Estimate simple, temperature, principal stresses and strains.
	R20C202.2	Sketch shear force and bending moment diagrams and locate point of contra flexure.
	R20C202.3	Determine bending and shear stresses in structural beams made of channel, I, T, Angle sections.
	R20C202.4	Estimate slope and deflection in structural beams.
	R20C202.5	Analyze stresses developed in pressure vessels.
II-I R20C203 Fluid Mechanics & Hydraulic Machines	R20C203.1	Describe the fluid properties, pressure measurement and stability analysis of floating, submerged bodies.
	R20C203.2	Differentiate flow types, Analyze Eulers&Bernoullis equations of motion.
	R20C203.3	Explain the concept of Boundary Layer, similitude with Dimensionless numbers
	R20C203.4	Analyze force exerted by jets on different geometries.
	R20C203.5	Illustrate working of Reciprocating & Centrifugal Pumps along with characteristic curves analysis, Discuss about Hydraulic Turbines, specific speed, unit quantities, characteristic curves
II-I R20C204 Production Technology	R20C204.1	Describe sand casting process and Design pattern, gating system.
	R20C204.2	Describe the solidification behavior of pure metals and alloys, design raiser and describe Centrifugal casting, Die casting and investment casting.
	R20C204.3	Classify welding processes and describe different types of gas welding and Arc welding processes.
	R20C204.4	Explain solid state welding processes, heat affected zones in welding and welding defects and design weld joints
	R20C204.5	Illustrate bulk forming processes like rolling, extrusion and powder metallurgy.
II-I R20C205 Kinematics of Machinery	R20C205.1	Contrive a mechanism for a given plane motion with single degree of freedom.
	R20C205.2	Suggest and analyze a mechanism for a given straight line motion and automobile steering motion.
	R20C205.3	Analyze the motion (velocity and acceleration) of a plane mechanism.
	R20C205.4	Suggest and analyze mechanisms for a prescribed intermittent motion like opening and closing of IC engine valves etc.
	R20C205.5	Select a power transmission system for a given application and analyze motion of different transmission systems
II-I R20C206 Computer Aided Engineering Drawing Practice	R20C206.1	Draw Projection of solids inclined to both planes using auxiliary plane method and Sectional views
	R20C206.2	Draw the development of surfaces and intersection of solids.
	R20C206.3	Draw the isometric and perspective projections of solids using general method
	R20C206.4	Draw geometric entities, Isometric projections, orthographic projections and model simple solids by using AutoCAD.
II-I	R20C207.1	Describe the fluid properties, pressure measurement and stability analysis of floating, submerged bodies.

R20C207 Fluid Mechanics & Hydraulic Machines Lab	R20C207.2	Differentiate flow types, Analyze Eulers&Bernoullis equations of motion.
	R20C207.3	Explain the concept of Boundary Layer, similitude with Dimensionless numbers
	R20C207.4	Analyze force exerted by jets on different geometries.
	R20C207.5	Illustrate working of Reciprocating & Centrifugal Pumps along with characteristic curves analysis, Discuss about Hydraulic Turbines, specific speed, unit quantities, characteristic curves
II-I R20C208 Production Technology Lab	R20C208.1	Design and make a pattern and Prepare mold cavities for solid, hollow castings
	R20C208.2	Evaluate properties of molding sand.
	R20C208.3	Design and fabricate weld joints by using arc and spot welding
	R20C208.4	Process plastic components by using injection and blow moulding
II-I R20C209 Drafting and Modeling Lab	R20C209.1	Develop part drawings in the form of orthographic and isometric.
	R20C209.2	Develop part drawings in the form of 3D models using AutoCAD.
	R20C209.3	Generate 3D models through extrude, revolve, sweep.
	R20C209.4	Generate 3D models and perform assembly modeling.
II-I R20C210 Essence of Indian Traditional Knowledge	R20C210.1	Defining what traditional knowledge means and its nature and characteristics. What are the types of traditional knowledge and it's physical and social context?
	R20C210.2	What is the need for protecting the traditional knowledge and its importance, value at global economy and the role of government to harness traditional knowledge?
	R20C210.3	Explain legal framework and analyses the plant variant protections. Contrast and compare the ST and the other traditional forest dwellers.
	R20C210.4	Evaluate strategies to increase the protection of TK. Analyze legal concepts for the protection of TK and apply systems of TK protection.
	R20C210.5	Explain the TK in different sectors. Evaluate food security and protection of TK in the country and analyze TK in engineering and in various sectors.
II-II R20C211 Material Science & Metallurgy	R20C211.1	Describe bonding in metals, alloys, crystallization and formation of solid solutions
	R20C211.2	Describe phase diagrams, solidification principles and interpret phases in binary phase diagrams.
	R20C211.3	Differentiate Cast Irons and Steels in their composition, properties and applications
	R20C211.4	Describe effect of alloying on iron- iron carbide system and choose the heat treatment process for desired properties.
	R20C211.5	Employ non-ferrous metals, alloys like aluminum, copper and titanium in practical applications
	R20C211.6	Classify the composition, properties, fabrication techniques and applications of ceramics and composite materials
II-II	R20C212.1	Apply Cauchy Riemann equations to find derivatives and integrals of complex function

R20C212 Complex Variables and Statistical Methods	R20C212.2	Write analytic function in power series and integrate complex function using Residue theorem
	R20C212.3	Apply discrete and continuous probability distributions in calculating probabilities
	R20C212.4	Apply Sampling techniques to give estimates of population
	R20C212.5	Test the hypothesis based on small and large sample tests.
II-II R20C213 Dynamics of Machinery	R20C213.1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
	R20C213.2	Compute frictional losses, torque transmission in bearings, clutches, brakes and dynamometers.
	R20C213.3	Analyze dynamic force analysis of slider crank mechanism and design of fly wheel.
	R20C213.4	Analyze the loads and forces on the governors.
	R20C213.5	Analyze balancing of masses in rotating and reciprocating machinery
	R20C213.6	Analyze free and forced vibrations of single degree freedom systems.
II-II R20C214 Thermal Engineering-I	R20C214.1	Describe the methods to improve the thermal efficiency of Rankine Cycle and methods to improve the efficiency of a steam power plant
	R20C214.2	Describe types of boilers, mounting, accessories in boilers and chimney performance parameters.
	R20C214.3	Analyze operating principles of nozzles, steam turbines and implementation.
	R20C214.4	Discriminate the major components of steam reaction turbines to regulate the speed and pressure and the principle of working of steam condensers and cooling towers and analysis.
	R20C214.5	Demonstrate the working principals of gas turbines and estimate efficiency.
	R20C214.6	Interpret the efficiencies of aircraft propulsion systems
II-II R20C215 Industrial Engineering and Management	R20C215.1	Explain the need of management in engineering discipline and to understand quantitative tools of IE in decision-making process.
	R20C215.2	Identifying the suitable plant site with optimal resources for the plant operation and to select proper plant maintenance methods to achieve bottom-line.
	R20C215.3	Identifying the best method using optimization techniques in work study, time study and work sampling Methods.
	R20C215.4	Compare the techniques, skills and modern engineering tools to determine the quality of the products.
	R20C215.5	Discriminate the need for continuous improvement through TQM, Six sigma methodology, value analysis.
	R20C215.6	Discriminate and implement ways of effective project management which include PERT, CPM techniques.
II-II R20C216	R20C216.1	Evaluate tensile, compressive, torsional, impact strength of a given specimen
	R20C216.2	Estimate the surface hardness of a given specimen

Mechanics of Solids and Metallurgy Lab	R20C216.3	Calculate the modulus of rigidity of a spring by conducting the deflection test
	R20C216.4	Determine the young's modulus of a given material by measuring deflections of cantilever and simply supported beams
	R20C216.5	Identify the material of a given specimen by investigating its micro stature
	R20C216.6	Estimate the harden ability of steels
II-II R20C217 Machine Drawing Practice	R20C217.1	Represent materials, machine components conventionally, sectioning, and draw temporary, permanent fastenings of machine elements.
	R20C217.2	Draw keyed joints, shaft couplings.
	R20C217.3	Draw socket & spigot pipe joint, bearings.
	R20C217.4	Draw assembly drawings from part drawings.
II-II R20C218 Theory of Machines Lab	R20C218.1	Determine the whirling speed of shaft theoretically and experimentally, position and speed of a Hartnell governor along with characteristic curve of radius of rotation
	R20C218.2	Analyze the motion of motorized gyroscope
	R20C218.3	Determine the frequency of un damped free and damped force vibrations of a spring mass system
	R20C218.4	Explain the static and dynamic balancing using rigid blocks and find the moment of inertia of flywheel
	R20C218.5	Develop displacement plots of Cam follower systems and kinematic analysis of slider crank or four bar mechanism
	R20C218.6	Determine the coefficient of friction between belt and pulley and study simple and compound screw jack, spur, helical, worm and Bevel gears
II-II R20C219 Python Programming Lab	R20C219.1	Identify Python programming environment and to design python applications.
	R20C219.2	Execute the conditional expressions and looping statements by using functions in PYTHON.
	R20C219.3	Able to write a program with the strings and matrices in PYTHON
	R20C219.4	Write the Program scripts and functions in PYTHON to solve the methods
III-I R20C301 Thermal Engineering-II	R20C301.1	Describe the methods to improve the thermal efficiency of Rankine Cycle and methods to improve the efficiency of a steam power plant
	R20C301.2	Describe types of boilers, mounting, accessories in boilers and chimney performance parameters.
	R20C301.3	Analyze operating principles of nozzles, steam turbines and implementation.
	R20C301.4	Discriminate the major components of steam reaction turbines to regulate the speed and pressure and the principle of working of steam condensers and cooling towers and analysis.

	R20C301.5	Demonstrate the working principals of gas turbines and estimate efficiency.
III-I R20C302 Design of Machine Members-I	R20C302.1	Describe the design process, manufacturing considerations in the design and apply theories of failures for simple machine members
	R20C302.2	Describe the stress concentration and estimates the fatigue strength in parts subjected to fluctuating loads
	R20C302.3	Design riveted, welded, bolted joints under axial and eccentric loading conditions
	R20C302.4	Design keys cotter, knuckle joints and power transmission shafts under loading
	R20C302.5	Design rigid and flexural couplings under loading
III-I R20C303 Machining, Machine Tools & Metrology	R20C303.1	Gain knowledge the basic concepts in mechanics of metal cutting, chip formation, various tool materials and tool life.
	R20C303.2	Understand the principle of lathe, its operations that can be performed in various lathes and mechanisms adopted.
	R20C303.3	Learn basic fundamentals of reciprocating machine tools shaper, slotter and planning machines ,drilling and boring tools
	R20C303.4	Understand the working principle, operations performed, work holding devices and different attachments in and milling machines
	R20C303.5	Gain knowledge on the fundamentals of finishing process, super finishing process and their associated machine tools.
III-I R20C304C Nano Technology	R20C304C.1	Describe Nano materials based on their dimensionality with respect to crystalline structure and band properties.
	R20C304C.2	Discuss the effect of size reduction, electronic structure of Nano material on properties.
	R20C304C.3	Explain top-down and bottom-up approaches for Nano materials fabrication.
	R20C304C.4	Describe characterization techniques for investigating Nano material.
	R20C304C.5	Describe synthesis of carbon Nano materials
III-I R20C305D Renewable Energy Sources	R20C305D.1	Explain the significance of solar radiation and solar energy collection process
	R20C305D.2	Describe the theory and working principle of solar energy storage and wind energy
	R20C305D.3	Explain the concept of the Biomass, Geothermal and ocean energy systems
	R20C305D.4	Distinguishes the different mechanical and electrical energy efficient systems
	R20C305D.5	Discuss the benefits of green manufacturing systems and explains the efficient and sustainable green production systems
III-I R20C306	R20C306.1	Perform step turning, taper turning, knurling, thread cutting operations on lathe machine
	R20C306.2	Perform drilling and tapping operations on radial drilling machines.
	R20C306.3	Perform shaping and planning operations.

Machine Tools Lab	R20C306.4	Perform gear cutting operation on milling machine
	R20C306.5	Generate single point cutting tool using tool and cutter grinding machine.
III-I R20C307 Thermal Engineering Lab	R20C307.1	Draw valve time diagram and port time diagram of 4stroke and 2stroke engines and Analyze the fuel properties.
	R20C307.2	Analyze performance, heat balance, friction loss and economical speed in S.I engine.
	R20C307.3	Analyze performance, heat balance, friction losses and in C.I engine.
	R20C307.4	Analyze the performance of variable compression ratio engine
	R20C307.5	Evaluate the performance of multistage reciprocating air compressor
III-I R20C308 Advanced Communication Skills Lab	R20C308.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C308.2	Speak fluently by practicing accent, rhythm and intonation.
	R20C308.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.
	R20C308.4	Employ suitable reading strategies to get the general the idea of a text and draft reports.
III-I R20C309 Professional Ethics and Human Values	R20C309.1	Define the development of an ethical perspective towards life.
	R20C309.2	Recognize the compatibility in our opinion and action.
	R20C309.3	Describe appropriate technologies and apply professional code of ethics.
	R20C309.4	Recognize and analyze the Risk benefit analysis and adopt Safety measures
	R20C309.5	Recall the professional responsibilities and rights to attain social harmony
III-II R20C310 Heat Transfer	R20C310.1	Describe basic modes of heat transfer and one-dimensional conduction
	R20C310.2	Compute temperature distribution in transient heat conduction and analyze fins
	R20C310.3	Interpret convection modes and perform dimensional analysis
	R20C310.4	Interpret and analyze forced and free convection heat transfer
	R20C310.5	Describe phase change heat transfer and design heat exchangers
	R20C310.6	Analyze radiation heat transfer
III-II R20C311 Design of Machine Members-II	R20C311.1	Select the type of sliding contact and rolling bearing bearings based on the design calculations.
	R20C311.2	Design of IC engine components like connecting rod, crank shaft, piston, cylinders, cylinder liners
	R20C311.3	Design of curved beams having rectangular, circular, T-section, trapezoidal cross-sections and design of crane hooks, C –clamps
	R20C311.4	Design the power transmission elements like V- belts, flat belts, rope drives, pulleys for belt and rope drives, chain drives and power screws
	R20C311.5	Design of spur, helical gears, Levers, brackets, hangers, wall boxes based on design criteria
III-II	R20C312.1	To understand the basic concepts of artificial intelligence, neural networks and genetic algorithms.

R20C312 Introduction to Artificial Intelligence and Machine Learning	R20C312.2	To understand the principles of knowledge representation and reasoning.
	R20C312.3	To gain knowledge about bayesian and computational learning and machine learning.
	R20C312.4	To explore various machine learning techniques.
	R20C312.5	To gain knowledge in machine learning analytics and deep learning techniques.
III-II R20C313A Automobile Engineering	R20C313A.1	Illustrate basic principles of automobile
	R20C313A.2	Explain the working of clutches, gear boxes, flywheel, rear axle types, wheels and tyres
	R20C313A.3	Describe the functioning of steering system
	R20C313A.4	Describe the functioning of suspension, braking and electrical systems
	R20C313A.5	Describe the engine specifications and safety systems
	R20C313A.6	Describe the environmental pollutants of automobile emissions& service of engine components
III-II R20C314C Advanced Materials	R20C314C.1	Explain the metals and alloys and their utility in different environments.
	R20C314C.2	Learn about polymers and ceramics and their applications.
	R20C314C.3	Analyze composite materials along with reinforcements and their applications.
	R20C314C.4	Apply the basics of shape memory alloys and functionally graded materials.
	R20C314C.5	Apply the basics of shape memory alloys and functionally graded materials.
III-II R20C315 Heat Transfer Lab	R20C315.1	Analyze the heat transfer by conduction.
	R20C315.2	Evaluate efficiency of extended surfaces
	R20C315.3	Estimate convective heat transfer coefficient.
	R20C315.4	Evaluate effectiveness of heat Exchangers
	R20C315.5	Perform experimental investigations on radiation heat transfer
	R20C315.6	Analyze heat transfer processes involving phase change
III-II R20C316 CAE&CAM Lab	R20C316.1	Develop part drawings in the form of orthographic and isometric.
	R20C316.2	Generate 3D models through extrude, revolve, sweep and performs assembly modeling.
	R20C316.3	Use analytical tools like ANSYS to determine stresses, deflections, frequencies and perform heat transfer analysis
	R20C316.4	Develop NC code for machining simple components on NC lathe.
III-II R20C317	R20C317.1	Evaluate the dimensions of the specimens by using various measuring instruments.
	R20C317.2	Perform the alignment test on lathe, and milling machines.

Measurements & Metrology Lab	R20C317.3	Calculate the angle and straightness measurement by using the respective measuring devices
	R20C317.4	Calibrate the pressure, temperature and displacement readings with the references.
	R20C317.5	Measure the angular displacement temperature measurement and speed measurement and also calculate the flow and strain with the help of rotameter and strain gauge respectively.
III-II R20C318 Artificial Intelligence and Machine Learning Lab	R20C318.1	Demonstrate expertise in data preprocessing techniques using Weka and Python, including data cleaning, transformation, and feature engineering, to prepare datasets for machine learning tasks.
	R20C318.2	Acquire the skills to build decision tree models for classification, specifically for the Soybean classification problem. They will also be proficient in evaluating these models using performance metrics and visualizations.
	R20C318.3	Learn how to generate association rules from weather data using Weka and Python. They will be able to interpret and apply these rules for meaningful insights and decision-making in various domains, such as market basket analysis.
	R20C318.4	Gain a broad understanding of machine learning techniques, including classification and clustering, using scikit-learn, Weka, and Python. They will be capable of selecting and applying appropriate machine learning models to different types of data, along with assessing model performance and interpreting results.
III-II R20C319 Research Methodology and IPR	R20C319.1	Understand objectives and characteristics of a research problem
	R20C319.2	Analyze research related information and to follow research ethics
	R20C319.3	Understand the types of intellectual property rights
	R20C319.4	Learn about the scope of IPR.
	R20C319.5	Understand the new developments in IPR.
IV-I R19C401 Industrial Management	R19C401.1	Explain the need of management in engineering discipline and to apply quantitative tools of IE in decision-making process.
	R19C401.2	Locate the suitable plant site with optimal resources for the plant operation and Develop and implement work study methods to achieve bottom-line.
	R19C401.3	Analyze the best method using optimization techniques work study, time study and work sampling.
	R19C401.4	Use the techniques, skills and modern engineering tools to determine the quality of the products.
	R19C401.5	Describe the need for continuous improvement through TQM, Six sigma methodology, value analysis.
IV-I R19C402 Finite Element Methods	R19C402.1	Derive displacement, stress, strain relations and apply variational and weighted residual methods to solve differential equations.
	R19C402.2	Identify the application and characteristics of FEA elements and construct global stiffness matrix
	R19C402.3	Analyze truss and beam problems using finite element methods
	R19C402.4	Analyze plane stress, plane strain and axi-symmetric problems using Two dimensional elements

	R19C402.5	Analyze problems using higher order and isoperimetric elements
IV-I R19C403B Renewable Energy Sources	R19C403B.1	Explain the significance of solar radiation and solar energy collection process
	R19C403B.2	Describe the theory and working principle of solar energy storage and wind energy
	R19C403B.3	Explain the concept of the Biomass, Geothermal and ocean energy systems
	R19C403B.4	Distinguishes the different mechanical and electrical energy efficient systems
	R19C403B.5	Discuss the benefits of green manufacturing systems and explains the efficient and sustainable green production systems
IV-I R19C404C Power Plant Engineering	R19C404C.1	Describe the conventional methods of the power generation through steam
	R19C404C.2	Discuss the principle of operation of internal combustion and gas turbine power plant
	R19C404C.3	Explain the power generation through hydroelectric power
	R19C404C.4	Interpret the power generation through nuclear power plant
	R19C404C.5	Describe the working combined power generation plants
IV-I R19C405D Nano Technology	R19C405D.1	Describe Nano materials based on their dimensionality with respect to crystalline structure and band properties.
	R19C405D.2	Discuss the effect of size reduction, electronic structure of Nano material on properties.
	R19C405D.3	Explain top-down and bottom-up approaches for Nano materials fabrication.
	R19C405D.4	Describe characterization techniques for investigating Nano material.
	R19C405D.5	Describe synthesis of carbon Nano materials
IV-I R19C406 Finite Element Simulation Lab	R19C406.1	Develop part drawings in the form of orthographic and isometric.
	R19C406.2	Generate 3D models through extrude, revolve, sweep and performs assembly modeling.
	R19C406.3	Use ANSYS to determine stresses, deflections, frequencies and perform heat transfer analysis
	R19C406.4	Develop NC code for machining simple components on NC lathe.
IV-I R19C407 Project-I	R19C407.1	Identifies the problem through Literature survey considering contemporary issues.
	R19C407.2	Selects an appropriate tool/design procedure to overcome the problem.
	R19C407.3	Analyzes the data, evaluates the problem and critically assess the results.
	R19C407.4	Identifies the process of fabrication / manufacturing and develops a model.
	R19C407.5	Summaries the results and documents the work as a technical report.
IV-II R19C408A Additive Manufacturing	R19C408A.1	Describe various CAD issues for 3D printing and rapid prototyping and related operations for STL model manipulation.
	R19C408A.2	Formulate and solve typical problems on reverse engineering for surface reconstruction from physical prototype models through digitizing and spline-based surface fitting.

	R19C408A.3	Formulate and solve typical problems on reverse engineering for surface reconstruction from digitized mesh models through topological modelling and subdivision surface fitting.
	R19C408A.4	Explain and summarize the principles and key characteristics of additive manufacturing technologies and commonly used 3D printing and additive manufacturing systems.
	R19C408A.5	Explain and summarize typical rapid tooling processes for quick batch production of plastic and metal parts
IV-II R19C409C Non Destructive Evaluation	R19C409C.1	Describe working principles of radiography testing interpretation and evaluation.
	R19C409C.2	Explain ultrasonic testing and perform inspection of samples
	R19C409C.3	Identify the flaws and cracks using liquid penetrant test and eddy current test
	R19C409C.4	Identify the surface, subsurface flaws and cracks using magnetic particle test
	R19C409C.5	Detect the flaws of given samples by infrared and Thermal Testing
IV-II R19C410A Green Energy Systems	R19C410A.1	Explain the importance of solar energy collection and storage.
	R19C410A.2	Apply the principles of wind energy and biomass energy.
	R19C410A.3	Analyze knowledge on geothermal and ocean energy.
	R19C410A.4	Learn about energy efficient systems.
	R19C410A.5	Discuss the concepts of green manufacturing systems.
IV-II R19C411D Entrepreneurship	R19C411D.1	Get the awareness of entrepreneurship concept.
	R19C411D.2	Get the awareness on Industrial policies.
	R19C411D.3	Gain the competency of preparing business plans.
	R19C411D.4	study the impact of launching small business.
	R19C411D.5	Understand the recourse planning and market selection for start-ups.
IV-II R19C412 Project-II	R19C412.1	Identifies the problem through Literature survey considering contemporary issues.
	R19C412.2	Selects an appropriate tool/design procedure to overcome the problem.
	R19C412.3	Analyses the data, evaluates the problem and critically assess the results.
	R19C412.4	Identifies the process of fabrication / manufacturing and develops a model.
	R19C412.5	Summaries the results and documents the work as a technical report.

Department of Electronics and Communication Engineering

I-I & I-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C101 Communicative English	R20C101.1	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
	R20C101.2	Form sentences using proper grammatical structures and correct word forms.
	R20C101.3	Recognize paragraph structure and be able to match beginnings, endings and headings with paragraphs.
	R20C101.4	Assess social, cultural and environmental issues with a scientific point of view.
R20C102 Mathematics - I	R20C102.1	Test the convergence of an infinite series.
	R20C102.2	Apply Ordinary Differential Equations of first Order and first Degree to various engineering fields.
	R20C102.3	Apply Linear Differential Equations of higher order with constant coefficients to various engineering fields.
	R20C102.4	Utilize Partial differentiation in optimization of functions of several variables.
	R20C102.5	Apply Double and Triple integration techniques in evaluating areas and volumes of bounded regions.
R20C103 Applied Chemistry	R20C103.1	Elucidate polymerization techniques and identify suitable polymer material for a given engineering application.
	R20C103.2	Describe the working of primary cells, secondary cells and recognize control methods for standard types of corrosion.
	R20C103.3	Explicate characteristics, preparation methods and applications of advanced materials (Semiconductors, Insulators, Magnetic materials, Nanomaterials, Liquid crystals and Super conductors).
	R20C103.4	Acquaint about principles, applications of analytical techniques and non- conventional energy sources.
	R20C103.5	Understand the basics of computational chemistry and importance of molecular machines
R20C104 Programming for problem solving using C	R20C104.1	Develop skills to write, compile and debug programs in C language.
	R20C104.2	Use different operators, data types and write programs that use two-way/ multi-way selection and able to select the best loop construct for a given problem.
	R20C104.3	Design concepts of different types of arrays and implementation of arrays.
	R20C104.4	Design programs on string manipulation functions.
	R20C104.5	Implement pointers and compare structures and unions, preprocessor commands.
R20C105	R20C105.1	Draw regular polygons and Engineering Curves(Ellipse, parabola, Hyperbola, Cycloids and involutes), Scale (Plain, Diagonal & Vernier Scale) by using drawing instruments and standards

Engineering Drawing	R20C105.2	Draw orthographic projections of the points and projections of lines parallel to one plane, inclined to one principle plane
	R20C105.3	Draw orthographic projections of lines inclined to both the planes
	R20C105.4	Draw Orthographic projections of planes (simple position and inclined to both the planes)
	R20C105.5	Draw Orthographic projections of Solids (simple position and inclined to both the planes)
	R20C105.6	visualize and draw engineering objects in 3D view through isometric views and convert isometric to orthographic and vice versa
R20C106 English Communication skills laboratory	R20C106.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C106.2	Speak fluently by practicing accent, rhythm and intonation
	R20C106.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.
	R20C106.4	Employ suitable reading strategies to get the general idea of a text and draft reports.
R20C107 Applied Chemistry Lab	R20C107.1	Handle Conductivity meter, Colorimeter, P ^H -meter and Potentiometer for analysis of materials using small quantities involved for quick and accurate results.
	R20C107.2	Carry out acid- base titrations for Standardization of acids and estimation of alkalinity present in the given samples.
	R20C107.3	Calculate the quantity of ferrous ion and Manganese ions by using redox titrations.
	R20C107.4	Perform quantitative interpretations of titration and be familiar with the concept of hardness, turbidity and total dissolved salts in water sample.
	R20C107.5	Demonstrate the chemistry of iodine as direct and indirect oxidizing agent.
R20C108 Programming for problem solving using C Lab	R20C108.1	Gains Knowledge on various concepts of a C language.
	R20C108.2	Design and development of C problem solving skills.
	R20C108.3	Design and develop modular programming skills.
R20C109 Mathematics II	R20C109.1	Develop matrix techniques to find Eigen values and Eigen vectors
	R20C109.2	Apply Eigen values and Eigen vectors to reduce a quadratic form to canonical form by orthogonal transformation, and to singular value decomposition of a matrix.
	R20C109.3	Apply iterative methods to solve algebraic equation/transcendental equation/system of linear equations.
	R20C109.4	Interpolate data using various interpolating techniques.
	R20C109.5	Apply numerical techniques to find derivatives/to evaluate integrals/to solve initial value problems of first order, first degree ODE.

R20C110 Applied Physics	R20C110.1	Distinguish the phenomena of light- Interference, diffraction, polarization and determine the wavelength of given light using these phenomena.
	R20C110.2	Apply the concepts of light in optical fiber and lasers in communication system.
	R20C110.3	Calculate the energy of quantum particle at different energy levels and differentiate solids based on the band theory.
	R20C110.4	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications.
	R20C110.5	Classify the semiconductors and study the properties of superconductors
R20C111 Object Oriented Programming Through Java	R20C111.1	Remembering programming constructs, control structures, defining class and objects in Java
	R20C111.2	Evaluating Object oriented constructs such as various class hierarchies, interfaces and exception handling
	R20C111.3	Creating Applets and Layout managers in java
	R20C111.4	Applying Java AWT and Java Swings
	R20C111.5	Analyzing I/O and Events Handling in Java
	R20C111.6	Analyzing Threads, Exceptional Handling and I/O in Java
R20C112 Network Analysis	R20C112.1	Classify the electrical circuits and apply different analysis in network topologies
	R20C112.2	Estimate the transient circuits at DC excitation and AC excitation phenomena.
	R20C112.3	Explain the steady state analysis of AC circuits.
	R20C112.4	Identify the networks with different network theorems
	R20C112.6	Identify the two port networks using Z, Y, h parameters
R20C113 Basic Electrical Engineering	R20C113.1	Analyze the principle of operation and performance of DC machines
	R20C113.2	Analyze the principle of operation and performance of transformers
	R20C113.3	Analyze the principle of operation and performance of Synchronous machines
	R20C113.4	Analyze the performance and speed ? torque characteristics of a 3-phase induction motor and understand starting methods of 3-phase induction motor.
	R20C113.5	Understand the principle of operation and construction of various special machines
R20C114 Electronic Workshop Lab	R20C114.1	Identification of different electronic components
	R20C114.2	Study the laboratory equipment's used for power supplies in electronic components
	R20C114.3	Analyze the characteristics of electronic circuits by soldering practice
	R20C114.4	Study the PCB layout and its designing with the help of centimetre graph sheets
	R20C114.5	Analyze the characteristics of different electronic circuits using CRO
R20C115	R20C115.1	Analyze the characteristics and calculate the efficiency of DC machine.

Basic Electrical Engineering Lab	R20C115.2	Analyze the performance of a transformer by conducting load and no load tests.
	R20C115.3	Predict the performance characteristics of 3-phase induction motor
	R20C115.4	Determine the regulation of an alternator using synchronous impedance method
R20C116 Applied Physics Lab	R20C116.1	Examine the physical properties of light using interference and diffraction.
	R20C116.2	Calculate the numerical aperture and acceptance angle of optical fiber
	R20C116.3	Analyze the characteristics of semiconducting materials
	R20C116.4	Demonstrate the magnetizing behaviour of magnetic materials
	R20C116.5	Calculate the dielectric constant of a material
R20C117 Environmental Science	R20C117.1	Integrate multidisciplinary approach to environmental issues and demonstrate attributes of ecosystems in the environment
	R20C117.2	Create awareness about the exploitation of natural resources and their management
	R20C117.3	Recognize the importance of biodiversity and its conservation methods.
	R20C117.4	Illustrate strategies for abatement of environmental pollution
	R20C117.5	Comprehend various environmental legislations to combat the social issues and focus on environmental management

II-I & II-II Courses

COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C201 Electronic Devices and Circuits	R20C201.1	Describe the basic properties of semiconductor physics and analyze the operation & V-I characteristics of diodes
	R20C201.2	Design halfwave and full wave rectifiers with and without filters
	R20C201.3	Sketch the characteristics of Transistors
	R20C201.4	Analyze biasing methods, Stabilization and Compensation techniques of Transistors.
	R20C201.5	Analyze the Small Signal Low Frequency Transistor Amplifier models.
R20C202 Switching Theory and Logic Design	R20C202.1	Classify different number systems, codes and realize Boolean functions using logic gates.
	R20C202.2	Minimize switching functions using Boolean theorems and design arithmetic circuits using K-maps.
	R20C202.3	Design combinational logic circuits using LSI, MSI ICs and PLD's.
	R20C202.4	Design sequential logic circuits in synchronous and Asynchronous modes of operation using flip-flops.
	R20C202.5	Design innovative sequential circuits using Finite state machines.
R20C203	R20C203.1	understand various types of signals and systems mathematically and relate with vectors and signals.
	R20C203.2	Analyze the continuous- time signals and continuous-time systems using Fourier series & Fourier transforms.

Signals and Systems	R20C203.3	Define systems based on their properties and determine the response of LTI system.
	R20C203.4	Understand the concepts correlation, energy spectral density and power spectral density and Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct the original signal from samples.
	R20C203.5	Apply Laplace transforms, Z-transform to analyze continuous time and discrete time signals and systems and understand the concept of region of convergence.
R20C204 Random Variables and Stochastic Processes	R20C204.1	Construct probability distribution & density functions of a random variable.
	R20C204.2	Compute the statistical properties like mean, variance and characteristic functions and transformations of one random variable.
	R20C204.3	Construct the probability distribution & density functions, and compute the statistical properties of vector random variables
	R20C204.4	Study the classification of random processes. Analyze the time domain properties like stationarity and ergodicity of random processes
	R20C204.5	Analyze the spectral characteristics like power spectral density and its properties. Analyze the random signal response of the linear systems that includes mean, variance correlation between input and output and covariance.
R20C205 Mathematics-III	R20C205.1	Interpret the physical meaning of different operators such as gradient, curl and divergence and find the work done against a field, circulation and flux. using vector calculus
	R20C205.2	Apply the Laplace transform for solving Initial value problems.
	R20C205.3	Compute the Fourier series of periodic signals and applying integral expressions for the forward and inverse Fourier transforms.
	R20C205.4	Form PDEs and solve first order PDEs.
	R20C205.5	Identify solution methods for PDEs of higher order that model physical processes.
R20C206 Object Oriented Programming through Java Lab	R20C206.1	Apply the basic concepts of java programming in java
	R20C206.2	Implement applications using arrays in java
	R20C206.3	Analyze different keywords in java
	R20C206.4	Illustrate concepts of inheritance in java
	R20C206.5	create applications using exception, multithreading and packages in java
	R20C206.6	Illustrating GUI applications in java
R20C207	R20C207.1	Evaluate the V-I characteristics of diodes
	R20C207.2	Design half wave and full wave rectifiers with and without filters using diodes
	R20C207.3	Evaluate the performance characteristics of BJT, FET and UJT

Electronic Devices and Circuits Lab	R20C207.4	Analyze the signal parameters of given signal using CRO
	R20C207.5	Analyze the frequency response of amplifiers
R20C208 Switching Theory and Logic Design Lab	R20C208.1	Examine the functionality of Logic gates.
	R20C208.2	Design combinational circuits using Logic gates and Verify the functionality of combinational circuits available in IC form.
	R20C208.3	Design sequential circuits using logic gates and flip-flops
R20C209 Python Programming	R20C209.1	Identify various data types like lists, tuples, strings etc
	R20C209.2	Interpret comprehensions, generators in python.
	R20C209.3	Classify various pre-defined functions on the above data types
	R20C209.4	Apply exception handling in python
	R20C209.5	Use file I/O
R20C210 Electronic Circuit Analysis	R20C210.1	Analyze the high frequency model of BJT and FET amplifiers using hybrid pi model.
	R20C210.2	Design multistage amplifiers using BJT and FET
	R20C210.3	Analyze feedback topologies based on their input & output resistances, gain and bandwidth.
	R20C210.4	Design RC and LC oscillators using BJT and FET
	R20C210.5	Analyze large signal amplifiers based on operating point, power dissipation, distortion and efficiency and also design tuned amplifiers based on bandwidth, gain and quality factor.
R20C211 Digital IC Design	R20C211.1	Understand the basic concepts of Hardware description languages (VHDL and Verilog HDL).
	R20C211.2	Design and modelling of combinational logic circuits with relevant integrated circuits (ICs) using HDL.
	R20C211.3	Design and modelling of sequential logic circuits with relevant integrated circuits (ICs) using HDL.
	R20C211.4	Analyze the basic combinational MOS logic circuits.
	R20C211.5	Analyze the basic sequential MOS logic circuits.
R20C212 Analog Communications	R20C212.1	Analyze Amplitude modulation and demodulation techniques
	R20C212.2	Analyze the DSB-SC and SSB-SC modulations
	R20C212.3	Analyze Angle modulation and demodulation
	R20C212.4	Summarize the applications of Radio Transmitters and Receivers.
	R20C212.5	Calculate the effects of noise in continuous wave modulation techniques. And compare the pulse modulation techniques.
R20C213	R20C213.1	Calculate the transfer function of physical systems

Linear Control Systems	R20C213.2	Determine time response specifications of second order system, error constants and controller components of linear systems
	R20C213.3	Analyze the stability of linear time invariant systems using time domain analysis methods such as Routh's stability criterion and Root locus method.
	R20C213.4	Analyze the stability of linear time invariant systems using frequency domain analysis methods such as nyquist stability criterion, Bode and Polar plots.
	R20C213.5	Design Lag, Lead, Lag-Lead compensators to improve system performance by using Bode plots and tuning of PID controllers and develop the state model equations and identify the controllability and observability of a physical system.
R20C214 Management and Organizational Behavior	R20C214.1	Describe the concept of management, functions and organizational structure
	R20C214.2	Put forth the concepts of functional management
	R20C214.3	Knowledge on concepts of strategic management such as SWOT analysis, corporate planning.
	R20C214.4	Familiarized with the concepts of perception, Personality development and can equip with motivational theories.
	R20C214.5	Attain the group performance and grievance handling in managing the organizational culture.
R20C215 Electronic Circuit Analysis Lab	R20C215.1	Design frequency response of single stage and two stage RC coupled amplifier.
	R20C215.2	Compare gain and bandwidth of amplifier with and without feedback
	R20C215.3	Design LC and RC oscillators.
	R20C215.4	Examine gain and input resistance of Darlington and Bootstrap amplifier
	R20C215.5	Evaluate gain and efficiency of power amplifiers.
	R20C215.6	Design the frequency response of tuned amplifier.
R20C216 Analog Communications Lab	R20C216.1	Perform AM modulation and Demodulation in time and frequency domain
	R20C216.2	Perform and Simulate Angle modulation and Demodulation using Matlab/Simulink
	R20C216.3	Perform and Simulate Pulse modulation and demodulation techniques
	R20C216.4	Simulate AM Modulation and Demodulation using Matlab/Simulink
R20C217 Digital IC Design Lab	R20C217.1	Design, simulate, synthesize, and implementation of the digital integrated circuits using VHDL/Verilog HDL with Xilinx ISE on Spartan-6 FPGA module.
R20C218 Soft Skills	R20C218.1	Use language fluently, accurately and appropriately in debates and group discussions
	R20C218.2	Use their skills of listening comprehension to communicate effectively in cross-cultural contexts.
	R20C218.3	Learn and use new vocabulary
	R20C218.4	Write resumes, project reports and reviews.

	R20C218.5	Exhibit interview skills and develop soft skills.
III-I & III-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C301 Analog ICs and Applications	R20C301.1	Analyze AC & DC characteristics and measure Op-Amp parameters
	R20C301.2	Design linear and non-linear applications of Op-amp.
	R20C301.3	Design of active filters, analog multipliers and modulators using Op-Amp.
	R20C301.4	Describe the working principle of IC 555 timer, Phase Locked Loops and their applications.
	R20C301.5	Classify data converters used for real time data conversion.
R20C302 Electromagnetic Waves and Transmission Lines	R20C302.1	Evaluate various parameters for transmission lines using classical theory
	R20C302.2	Evaluate various parameters for transmission lines using smith chart
	R20C302.3	Interpret the behaviour of electrostatics
	R20C302.4	Interpret the behaviour of magnetostatic fields in materials
	R20C302.5	Summarize the Maxwells equations for static and time varying fields and to describe the propagation of electromagnetic waves in different media. Analyze the reflection and refraction of electromagnetic waves propagated in normal, oblique incidences and power relations
R20C303 Digital Communications	R20C303.1	Analyze the performance of a Digital Communication System using pulse digital modulation techniques.
	R20C303.2	Analyze digital transmission methods and detection techniques for bandpass transmission.
	R20C303.3	Evaluate the Error performance of Digital Modulation schemes
	R20C303.4	Analyze the Information theory and Source coding in communication systems.
	R20C303.5	Apply coding techniques in digital communication system in order to provide error detection and correction capabilities to the receiver.
R20C304A Data Structures	R20C304A.1	Select appropriate data structures as applied to specified problem.
	R20C304A.2	Summarize and understand the practical applications of several advanced techniques like Hashing.
	R20C304A.3	Demonstrate the operations such as Insertion, Deletion and Search on Data structures like Binary Search
	R20C304A.4	Demonstrate the operations such as Insertion, Deletion and Search on Advanced Data structures like Heaps, AVL trees and B Trees.
	R20C304A.5	Comparisons of trees like Red Black trees and B-Trees etc. and priority queue operations.
R20C305C	R20C305C.1	Analyze the performance of a computer
	R20C305C.2	Analyze the instruction set of computers
	R20C305C.3	Analyze I/O and memory interfaces of CPU

Computer Architecture and Organization	R20C305C.4	Analyze the control unit for processing of computers
R20C306 Analog ICs and Applications Lab	R20C306.1	Design and verify the functionality of various applications using Analog Integrated Circuits (IC 741, IC 555, IC 565, IC 566, IC 1496) like adder, subtractor, integrator, differentiator, multivibrators, active filters, Oscillators, PLL, VCO and DAC.
R20C307 Digital Communications Lab	R20C307.1	Analyze the pulse digital modulation techniques
	R20C307.2	Illustrate modulation, Demodulation, Noise handling, Data conversion and Multiplexing in pass band transmission
	R20C307.3	Analyze need of compression and expansion in digital communication.
	R20C307.4	Apply the various coding techniques on transmission medium in digital communications
R20C308 Data structures using Java Lab	R20C308.1	Apply different sorting and searching algorithms
	R20C308.2	Apply different operation on linear data structures like arrays, linked lists, stacks and queues.
	R20C308.3	Apply different operation on Binary tree and Binary Search Tree.
R20C309 Indian Traditional Knowledge	R20C309.1	Understand the concept of Traditional knowledge and its importance. Know the need and importance of protecting traditional knowledge.
	R20C309.2	Know the various enactments related to the protection of traditional knowledge. Understand the concepts of Intellectual property to protect the traditional knowledge
R20C310 Summer Internship	R20C310.1	Get exposure to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
	R20C310.2	Get possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job(s).
	R20C310.3	Gain experience in writing Technical reports / projects and presentation of it.
	R20C310.4	Learn and gain exposure to the engineer's responsibilities and ethics.
	R20C310.5	Understand the social, economic and administrative considerations that influence the working environment of industrial organizations.
R20C311 Microprocessor and Microcontrollers	R20C311.1	Identify a detailed Software and Hardware structure of the microprocessor
	R20C311.2	Develop assembly language programs for interfacing and various industrial requirements
	R20C311.3	Identify a detailed Software and Hardware structure of the Basic and Advanced Micro Controllers
R20C312 VLSI Design	R20C312.1	Analyze fabrication methods of ICs and electrical properties of MOSFET.
	R20C312.2	Design mask layout for MOS and Bi-CMOS circuits using basic circuit concepts and scaling factors.

	R20C312.3	Analyze the basic circuit concept and scaling factors
	R20C312.4	Analyze chip peripheral circuits and design for testability concepts
	R20C312.5	Design and analyze different FPGA architectures and analyze the Low power VLSI design in CMOS circuits.
R20C313 Digital Signal Processing	R20C313.1	Determine the solution of difference equations for the Discrete time systems using z transform.
	R20C313.2	Determine DFT using direct method and FFT algorithms.
	R20C313.3	Design digital IIR filters from the given analog filter specifications and realize the structures of IIR systems.
	R20C313.4	Design digital FIR filters using windowing technique and frequency sampling technique and realize the structures of FIR systems.
	R20C313.5	Explain concept of multirate signal processing and its applications, explain the concept of DSP Processors
R20C314B Mobile and Cellular Communication	R20C314B.1	Analyze analog and digital cellular radio systems for mobile communication.
	R20C314B.2	Analyze different types of interferences influencing cellular and mobile communication.
	R20C314B.3	Apply frequency management and channel allocation schemes to improve the trunking efficiency and cell coverage for signal traffic.
	R20C314B.4	Design the antenna system parameters by considering the effects in the reduction of C/I ratio.
	R20C314B.5	Analyze analog and digital cellular radio systems for mobile communication.
R20C315A Python Programming	R20C315A.1	Describe comprehend the basics of python programming
	R20C315A.2	Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology
	R20C315A.3	Explain the use of the built-in data structures list, sets, tuples and dictionary.
	R20C315A.4	Make use of functions and its applications
	R20C315A.5	Identify real-world applications using oops, files and exception handling provided by python.
R20C316 Microprocessor and Microcontrollers Lab	R20C316.1	Develop assembly language programs on arithmetic operations and logic operations and Interface peripheral devices like ADC 0808A & Stepper motor with 8086 microprocessor.
	R20C316.2	Develop assembly language programs on 8051 microcontroller for different logics and Interface peripheral devices like Traffic Light controller & LCD with 8086 microprocessor
	R20C316.3	Develop assembly language programs on ARM cortex using KEIL.
R20C317 VLSI Design Lab	R20C317.1	Design CMOS combinational circuits using Mentor Graphics CAD tools including layout, design rule checking and simulation with 130nm technology.
	R20C317.2	Design CMOS sequential circuits using Mentor Graphics CAD tools including layout, design rule checking and simulation with 130nm technology.

	R20C317.3	Design CMOS analog circuits using Mentor Graphics CAD tools including layout, design rule checking and simulation with 130nm technology.
R20C318 Digital Signal Processing Lab	R20C318.1	Understand the operation on discrete time signals using MATLAB
	R20C318.2	Examine linear, circular convolution, addition of sinusoidal signals and analyze the DFT/IDFT using MATLAB & Code Composer Studio
	R20C318.3	Design IIR Low pass and High pass filters, FIR filters with windowing techniques using MATLAB.
	R20C318.4	Analyze different image processing algorithms for various applications
R20C319 ARM based Aurdino based Programming	R20C319.1	Comprehend microcontroller – Transducers Interface techniques
	R20C319.2	Establish serial communication link with Arduino
	R20C319.3	Analyze basics of SPI interface
	R20C319.4	Interface stepper motor with Arduino
	R20C319.5	Analyze Accelerometer interface techniques
R20C320 Research Methodology	R20C320.1	Understand objectives and characteristics of a research problem
	R20C320.2	Analyze research related information and to follow research ethics.
	R20C320.3	Understand the types of intellectual property rights.
	R20C320.4	Learn about the scope of IPR.
	R20C320.5	Understand the new developments in IPR.
IV-I & IV-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R19C401 Microwave and Optical Communication Engineering	R19C401.1	Be Aware about the of various types of O-type microwave tubes To gain knowledge about the operation of HELIX TWTS, M-type tubes
	R19C401.2	To Gain knowledge about working of various microwave components
	R19C401.3	Interpret an optical fiber communication link & structural characteristics of different optical fibers
	R19C401.4	Analyze the concepts of LED,LASER,PIN, and APD's used in optical link
	R19C401.5	To study about microwave solid state devices their classification, operation and measure microwave parameters using a Microwave test bench.
R19C402 Data Communications	R19C402.1	Describe network categories and functions of various Data communication Networks.
	R19C402.2	Analyze error detection & correction algorithms & transmission protocols.
	R19C402.3	Categorize mechanism of routing the data in network layer.
	R19C402.4	Analyze the implementation of connection less service and connection oriented service.

and Computer networks	R19C402.5	Understand the Functioning of various Application layer Protocols.
R19C403 Digital Image and Video Processing	R19C403.1	Understand the fundamental steps of image processing and apply the transform techniques on images
	R19C403.2	Apply image enhancement and image restoration operations on images
	R19C403.3	Apply image segmentation and image clustering operations on images
	R19C403.4	Develop coding techniques for image compression and wavelet based image processing
	R19C403.5	Describe various steps of video processing, sampling and filtering of video signals
	R19C403.6	Describe various motion estimation algorithms and their applications to video coding
R19C404A Communication Standards and Protocols	R19C404A.1	Describe the categories and functions of various data communications networks
	R19C404A.2	Describe the functionalities of OSI layers
	R19C404A.3	Analyze various wired communication protocols
	R19C404A.4	Analyze various wireless communication protocols
	R19C404A.5	Analyze the concepts of network types and network security
R19C405C Embedded Systems	R19C405C.1	Understand the building blocks of typical embedded system and different memory technology and memory types.
	R19C405C.2	Understand the Communication devices, Timers and Counting devices
	R19C405C.3	Understand the concepts of C versus Embedded C and Compiler versus cross-compiler
	R19C405C.4	Understand RTOS functions and issues in Hardware, Software Co-design
	R19C405C.5	Understand the IDE and types of files generated on Tools assurance and testing of the design ,testing on host machine, Simulators
R19C406 Internet of Things Lab	R19C406.1	Understand interfacing of sensors & actuators with Raspberry Pi / Arduino / Node MCU
	R19C406.2	Analyze various ARM Keil MDK version for programming & implement debugging an application on PSoC 4 BLE
	R19C406.3	Implement serial communication with Raspberry Pi / Arduino / Node MCU
R19C407 Microwave and Optical Communication Engineering Lab	R19C407.1	Evaluate the VI characteristics of microwave sources like reflex klystron, Gunn diode and optical sources like LED's & Lasers
	R19C407.2	Analyze and measure the parameters of passive microwave components using a standard microwave test bench
	R19C407.3	Evaluate the NA, losses, intensity modulation for the analog optical fiber and data rate for digital optical fiber.
R19C408 Project - Part I	R19C408.1	Envisaging applications for societal needs
	R19C408.2	Develops skills for analysis and synthesis of practical systems

	R19C408.3	Acquire the use of new tools effectively and creatively
	R19C408.4	Work in team to carry out analysis and cost-effective, environmental friendly designs of engineering systems
	R19C408.5	Write Technical / Project reports and oral presentation of the work done to an audience
	R19C408.6	Demonstrate a product developed
R19C409A Wireless Communication	R19C409A.1	Understand about the Wireless systems and Standards (1G/2G/3Gsystems).
	R19C409A.2	Analyze the concepts of Code Division Multiple Access Technique.
	R19C409A.3	Describe the concepts of Multiple-Input Multiple-Output(MIMO)
	R19C409A.4	Analyze the concepts of Orthogonal Frequency Division Multiple Access Technique.
	R19C409A.5	Analysis of Satellite-Based Wireless systems.
R19C410C Cyber Security and Cryptography	R19C410C.1	Demonstrate cyber-crime fundamentals and challenges
	R19C410C.2	Identify various tools and methods used for cyber security
	R19C410C.3	Analyze various cyber-crime investigation tools and cryptography techniques
	R19C410C.4	Analyze various computer forensic investigation tools and methods
	R19C410C.5	Analyze legal perspective of cyber security
R19C411 Project-II	R19C411.1	Envisaging applications in various areas for societal needs
	R19C411.2	Develops skills for analysis and synthesis of practical systems
	R19C411.3	Acquire the use of new tools effectively and creatively
	R19C411.4	Work in team to carry out analysis and cost-effective, environmental friendly designs of engineering systems
	R19C411.5	Write Technical / Project reports and oral presentation of the work done to an audience
	R19C411.6	Demonstrate a product developed

Department of Computer Science Engineering

I-I & I-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C101	R20C101.1	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.

Communicative English	R20C101.2	Form sentences using proper grammatical structures and correct word forms.
	R20C101.3	Recognize paragraph structure and be able to match beginnings, endings and headings with paragraphs.
	R20C101.4	Assess social, cultural and environmental issues with a scientific point of view.
R20C102 Mathematics - I	R20C102.1	Test the convergence of an Infinite series.
	R20C102.2	Apply ODE of first Order and first Degree to various engineering fields.
	R20C102.3	Apply Linear Differential Equations of higher order with constant coefficients to various engineering fields.
	R20C102.4	Utilize Partial differentiation in optimization of functions of several variables.
	R20C102.5	Apply Double and Triple integration techniques in evaluating areas and volumes of bounded regions.
R20C103 Applied physics	R20C103.1	Distinguish the phenomena of light- Interference, diffraction, polarization and determine the wavelength of given light using these phenomena.
	R20C103.2	Apply the concepts of light in optical fiber and lasers in communication system.
	R20C103.3	Calculate the energy of quantum particle at different energy levels and differentiate solids based on the band theory.
	R20C103.4	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications
	R20C103.5	Classify the semiconductors and study the properties of superconductors
R20C104 Programming for problem solving using c	R20C104.1	Practice fundamentals of C programming language with tokens to write solutions for problems
	R20C104.2	Use different operators, control statements to write programs that use selection and loop constructs.
	R20C104.3	Apply concepts like arrays, strings, structures, and unions
	R20C104.4	Analyze pointers concepts with different pointer applications.
	R20C104.5	Illustrate writing programs with functions and concepts of File I/O.
R20C105 Computer engineering workshop	R20C105.1	Assemble and disassemble components of a PC system commands basic concepts of IOT
	R20C105.2	Construct a fully functional Virtual Machine Summarize Various Linux operating system, Networking Commands and Internet Services.
	R20C105.3	Make use of HTML TAGS, Demonstrate and practice on test editors, MS office, and latex programs.
R20C106 English communication skills laboratory	R20C106.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C106.2	Speak fluently by practising accent, rhythm and intonation
	R20C106.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction
	R20C106.4	Employ suitable reading strategies to get the general idea of a text and draft reports.
R20C107	R20C107.1	Examine the physical properties of light using interference and diffraction.
	R20C107.2	Calculate the numerical aperture and acceptance angle of optical fiber

Applied physics lab	R20C107.3	Analyze the characteristics of semiconducting materials
	R20C107.4	Demonstrate the magnetizing behaviour of magnetic materials
	R20C107.5	Calculate the dielectric constant of a material
R20C108 Programming for problem solving using c lab	R20C108.1	Demonstrate C basic programming concepts like tokens, operators, datatypes to develop programs
	R20C108.2	Illustrate control statements with selection and loop constructs
	R20C108.3	Apply concepts of arrays, strings, structures, and unions.
	R20C108.4	Analyse pointers, applications of pointers programs
	R20C108.5	Practice programs on functions and concepts of File I/O.
R20C109 Mathematics II linear algebra and numerical methods	R20C109.1	Develop matrix techniques to find Eigen values and Eigen vectors
	R20C109.2	Apply Eigen values and Eigen vectors to reduce a quadratic form to canonical form by orthogonal transformation, and to singular value decomposition of a matrix
	R20C109.3	Apply iterative methods to solve algebraic equation/transcendental equation/system of linear equations
	R20C109.4	Interpolate data using various interpolating techniques.
	R20C109.5	Apply numerical techniques to find derivatives/to evaluate integrals/to solve initial value problems of first order, first degree ODE.
R20C110 Applied Chemistry	R20C110.1	Elucidate polymerization techniques and identify suitable polymer material for a given engineering application.
	R20C110.2	Describe the working of primary cells, secondary cells and recognize control methods for standard types of corrosion.
	R20C110.3	Explicate characteristics, preparation methods and applications of advanced materials (Semiconductors, Insulators, Magnetic materials, Nanomaterials, Liquid crystals and Super conductors).
	R20C110.4	Acquaint about principles, applications of analytical techniques and non- conventional energy sources.
	R20C110.5	Understand the basics of computational chemistry and importance of molecular machines
R20C111 Computer Organization	R20C111.1	Analyze various number systems and Relate postulates of Boolean algebra and minimize combinational functions.
	R20C111.2	Design and analyze combinational and sequential circuits.
	R20C111.3	Design computer arithmetic, microinstructions, and organization.
	R20C111.4	Analyze the microprogrammed control and central processing unit.
	R20C111.5	Analyze the memory organization and input-output organization.
R20C112	R20C112.1	Apply essential programming skills like data types, decision structures
	R20C112.2	Apply control statements and strings in Python

Python Programming	R20C112.3	Apply standard programming constructs using functions, modules, and packages
	R20C112.4	Apply operations on files, object? oriented concepts using case studies
	R20C112.5	Apply graphical user interface and Error handling exceptions concepts in Python
R20C113 Data Structures	R20C113.1	Apply Algorithm for solving problems like searching and sorting
	R20C113.2	Identify the representation and various operations on linked lists
	R20C113.3	Examine the concepts of stack and queues for the given specific application using arrays and linked lists
	R20C113.4	Examine the properties and apply operations on binary trees and Binary search trees
	R20C113.5	Analyze the properties and operations on graphs and implement the graph applications
R20C114 Applied Chemistry Lab	R20C114.1	Handle Conductivity meter, Colorimeter, PH-meter and Potentiometer for analysis of materials using small quantities involved for quick and accurate results.
	R20C114.2	Carry out acid- base titrations for Standardization of acids and estimation of alkalinity present in the given samples.
	R20C114.3	Calculate the quantity of ferrous ion and Manganese ions by using redox titrations.
	R20C114.4	Perform quantitative interpretations of titration and be familiar with the concept of hardness, turbidity and total dissolved salts in water sample.
	R20C114.5	Demonstrate the chemistry of iodine as direct and indirect oxidizing agent.
R20C115 Python Programming Lab	R20C115.1	Apply the basics of programming in the Python language.
	R20C115.2	Apply lists, tuples and dictionaries for solving compound data using functions.
	R20C115.3	Apply the fundamental notions and techniques used in object- oriented programming
R20C116 Data Structures Lab	R20C116.1	Apply different sorting and searching algorithms
	R20C116.2	Apply different operation on data structures like arrays, linked lists, stacks and queues, Trees
R20C117 Environment Science	R20C117.1	Identify environmental issues from an interdisciplinary perspective and regulation of ecosystems.
	R20C117.2	Focus on sustainable usage of natural resources in global concern.
	R20C117.3	Interpret the importance of biodiversity and maintain ecological balance.
	R20C117.4	Categorize the various types of environmental pollution and their control methods.
	R20C117.5	Ascertain the environmental legislations to control the social issues and paraphrase the proposed methodologies for environmental management
II-I & II-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME

R20C201 Mathematics III	R20C201.1	Interpret the physical meaning of different operators such as gradient, curl and divergence and find the work done against a field, circulation and flux. using vector calculus
	R20C201.2	Apply the Laplace transform for solving Initial value problems
	R20C201.3	Compute the Fourier series of periodic signals and applying integral expressions for the forward and inverse Fourier transforms
	R20C201.4	Form PDEs and solve first order PDEs
	R20C201.5	Identify solution methods for PDEs of higher order that model physical processes
R20C202 Object Oriented Programming through CPP	R20C202.1	Classify object oriented programming and procedural oriented programming with introduction to c++
	R20C202.2	Build classes and objects using functions, constructors and destructors
	R20C202.3	Apply inheritance and operator overloading concepts in C++
	R20C202.4	Examine Pointers and binding in C++
	R20C202.5	Evaluate Generic programming, Exception handling and templates in C++
R20C203 Operating Systems	R20C203.1	Define the functional aspects and implementation methods (system call and system programs) of different modules in a general purpose operating system
	R20C203.2	Apply scheduling algorithms and inter-process communication methods of processes handled by operating systems through examples
	R20C203.3	Solve various memory management strategies such as paging and segmentation, virtual memory, swapping and page replacement algorithms
	R20C203.4	Identify deadlock detection and recovery, deadlock prevention and avoidance algorithms. Examine the disk structure, disk scheduling and storage implementation
	R20C203.5	List various security measures and system protection techniques
R20C204 Software Engineering	R20C204.1	Compare conventional and agile software development methods
	R20C204.2	Identify the software requirements of a given project and then develop an SRS document
	R20C204.3	Make use of the developed SRS document and then build appropriate software design methodologies
	R20C204.4	Classify the different levels of software testing like black box and white box testing methodologies and explain them
	R20C204.5	Explain the quality control and how to ensure a good quality software
R20C205 Mathematical Foundation of	R20C205.1	Apply Mathematical Logic
	R20C205.2	Apply Sets, Relations, Functions and Algebraic Structures
	R20C205.3	Apply Combinatorics and Number Theory
	R20C205.4	Apply methods to solve homogeneous and non-homogeneous recurrence relations

Computer Science	R20C205.5	Apply methods and algorithms to solve graph theory problems
R20C206 Object Oriented Programming through CPP Lab	R20C206.1	Apply concept of classes and objects with Constructors, Destructors to solve problems
	R20C206.2	Apply pointers and friend functions in C++
	R20C206.3	Apply Operator overloading concepts and types of Inheritance in C++
	R20C206.4	Apply exception handling concepts and templates
R20C207 Operating Systems Lab	R20C207.1	Make use of Linux environment for Unix utilities and perform basic shell and file access control
	R20C207.2	Solve various CPU Scheduling and page replacement algorithms
	R20C207.3	Distinguish the Banker's algorithm implementation for deadlock avoidance and prevention
	R20C207.4	Survey process communication, process synchronization and usage of pthread library
R20C208 Software Engineering Lab	R20C208.1	Prepare SRS for the given user story
	R20C208.2	Develop Software Blue-prints using tools
	R20C208.3	Estimate Effort and Cost of Software Development
	R20C208.4	Generate Test Suite for Functional Testing
R20C209A Applications of Python NumPy	R20C209A .1	Understand how to install different scientific python distributions & apply basic functions for developing NumPy array
	R20C209A .2	Apply array properties & manipulation functions to frame arrays
	R20C209A .3	Apply NumPy data types & functions to perform mathematical operations
	R20C209A .4	Examine the string operations by classifying arrays & nd-arrays
	R20C209A .5	Create an application using NumPy financial functional programming
R20C210 Constitution of India	R20C210.1	Understand the History and features of Indian constitution
	R20C210.2	Explain the roles of President and Prime Minister, Structure of supreme court and High court
	R20C210.3	Discuss the structure and functions of state secretariat
	R20C210.4	Describe Zillapanchayat block level organisation
	R20C210.5	Explain the roles of Election Commission, SC/ST/OBC and women commissions
R20C211	R20C211.1	Classify the concepts of data science and its importance.
	R20C211.2	Examine the relation between the bivariate data using the tools correlation and Regression.

Probability And Statistics	R20C211.3	Apply discrete and continuous probability distributions to find probabilities.
	R20C211.4	Apply Sampling techniques to get estimates of the population.
	R20C211.5	Test the hypothesis based on small and large sample tests.
R20C212 Database Management Systems	R20C212.1	Explain the database management system structure, applications& differentiate data models.
	R20C212.2	Construct the Basic SQL, DML Operations using SQL Functions.
	R20C212.3	Identify the Relationships in ER Diagrams using integrity Constrains.
	R20C212.4	Compare various normal forms based on Functional Dependency.
	R20C212.5	Make use of ACID Properties &Examine the indexing structure using algorithms
R20C213 Formal Languages and Automata Theory	R20C213.1	Understand DFA , NFA, Mealy, Moore Machines
	R20C213.2	Understand the equivalence between re and FA and apply interconversion
	R20C213.3	Understand the context free grammars and operations on them
	R20C213.4	Understand the acceptance of CFG by Push Down Automata and apply interconversion
	R20C213.5	Understand the construction of Turing Machines and apply it
	R20C213.6	Comprehend the hierarchy of problems arising in the Computer Science
R20C214 Java Programming	R20C214.1	Understanding object-oriented concepts, control structures in Java.
	R20C214.2	Understanding Object oriented constructs such as various class hierarchies, Methods
	R20C214.3	Applying concepts like arrays, inheritances, interfaces in java
	R20C214.4	Analysing packages and exception handling in java
	R20C214.5	Apply multi-threading, strings and JDBC connections in java
R20C215 Managerial Economics and Financial accountancy	R20C215.1	Understanding the concept of managerial economics, Demand function, different methods of demand forecasting.
	R20C215.2	Discuss the concepts of production function, economies of scale, optimum size of the firm, cost & break-even analysis
	R20C215.3	Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles
	R20C215.4	Prepare financial statements for analysis by using accounting tools.
	R20C215.5	Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business.
R20C219B	R20C219B.1	Develop of the major Web application tier Client-side development

Web Application Development Using Full Stack	R20C219B.2	Participate in the active development of cross-browser applications through JavaScript
	R20C219B.3	Develop JavaScript applications that transition between states
R20C216 Database Management Systems Lab	R20C216.1	Write queries for creation, dropping, altering, view of tables, DML operations, access operations, built-in functions, operators, subqueries and nested queries in databases.
	R20C216.2	Implement PL/SQL programs using control structures, Exceptions, procedures, functions, packages, triggers, cursors, forms, reports.
	R20C216.3	Design programs using triggering, indexing & nonindexing technique
R20C217 R Programming Lab	R20C217.1	Illustrate R basic concepts by installing R & data frames concept in R to solve different problems
	R20C217.2	Apply concept of matrix in R to solve different mathematical problems
	R20C217.3	Apply concept of data frames, vector in R to solve problems for numerical analysis
	R20C217.4	Apply list concept in R to form different data structures
R20C218 Java Programming Lab	R20C218.1	Apply the basic of concepts of programming in java
	R20C218.2	Apply the basic of concepts of Operations, Expressions, Control-flow, and Strings.
	R20C218.3	Analyze different keywords in java.
	R20C218.4	Analyze the concepts of inheritance in java.
	R20C218.5	Analyze applications using Exception Handling, Multi threading, Applet, Event Handling packages in java
III-I & III-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R20C301 Computer Networks	R20C301.1	Identify OSI and TCP/IP network reference models & categories of transmission media and multiplexing techniques
	R20C301.2	Compare error control and flow control mechanisms in data link layer
	R20C301.3	Examine MAC layer protocols and WLAN protocols
	R20C301.4	Distinguish the routing algorithms and congestion control algorithms
	R20C301.5	Determine the features and operations of transport and application layer protocols
R20C302 Design and Analysis of Algorithms	R20C302.1	Understand asymptotic notations used for denoting performance of algorithms, time complexities' for various algorithmic approaches
	R20C302.2	Apply divide-and conquer & greedy Methods to solve problems
	R20C302.3	Apply dynamic programming to solve various problems

	R20C302.4	Apply backtracking technique to solve various problems
	R20C302.5	Apply the technique of NP-Hard and NP-Completeness to various problems
R20C303 Data Warehousing and Data Mining	R20C303.1	Able to understand the basic principles, functionalities, strengths, weaknesses and algorithms of Data warehousing and mining
	R20C303.2	Apply different data pre processing techniques on given data / data set for align the data
	R20C303.3	Apply appropriate data mining algorithms/ techniques to solve real world problems in mathematical way
	R20C303.4	Analyze different alternative techniques for classification on same data / different datasets
	R20C303.5	Analyze the behavior of various algorithms used in the analysis process of various data
	R20C303.6	Evaluate different data mining techniques like classification, prediction, clustering and association rule mining
R20C304 Digital Logic Design	R20C304.1	Classify different number systems, codes and realize Boolean functions using logic gates
	R20C304.2	Minimize switching functions using Boolean theorems and design arithmetic circuits using K-maps
	R20C304.3	Design combinational logic circuits using LSI, MSI ICs and PLD?s
	R20C304.4	Design sequential logic circuits in synchronous and Asynchronous modes of operation using flip-flops
	R20C304.5	Design innovative sequential circuits using Finite state machines
R20C305A Artificial Intelligence	R20C305A.1	Understanding different types of AI systems, applications, languages and current trends
	R20C305A.2	Identify various AI search algorithms (Un-informed, Informed, Heuristic, Constraint Satisfaction)
	R20C305A.3	Examine the logic concepts - propositional logic, axiomatic system, predicate logic
	R20C305A.4	Demonstrate working knowledge of representation using semantic network , extended semantic network ,conceptual dependency and script structure
	R20C305A.5	Identify expert systems like rule based, black board and truth maintenance systems
R20C305B Software Project Management	R20C305B.1	Explain the basic concepts and issues of software project management, how to effectively plan the project and improving software economics and Illustrate the project approach by old and new methods, iterative process
	R20C305B.2	Illustrate the life cycle phases and artifacts of process
	R20C305B.3	Interpret the software workflows of the process, checkpoints of process and Distinguish iterative process planning
	R20C305B.4	Distinguish project organizations and responsibilities, examine and control the process automation and instrumentation
	R20C305B.5	Implement the project plans, communication ,modeling, and construction and deployment practices in software development
R20C306	R20C306.1	Identify the data mining & data warehouse fundamental concepts and techniques from multiple perspectives

Data Warehousing and Data Mining Lab	R20C306.2	Analyze data by using data mining algorithms and techniques such as clustering, association mining, classification and prediction
R20C307 Computer Networks Lab	R20C307.1	Apply various networking commands
	R20C307.2	Analyze the working model of client/server using TCP
	R20C307.3	Analyze the working model of client/server using UDP
	R20C307.4	Examine the operation of routing and security algorithm
	R20C307.5	Compare the functioning of various transport protocols
R20C308B Continuous Integration and Continuous Delivery using Devops	R20C308B.1	Understand the why, what and how of DevOps adoption
	R20C308B.2	Attain literacy on Devops
	R20C308B.3	Align capabilities required in the team
	R20C308B.4	Create an automated CICD pipeline using a stack of tools
R20C310 Machine Learning	R20C310.1	Understand the fundamental usage of the concept Machine Learning system
	R20C310.2	Demonstrate on various regression Technique
	R20C310.3	Analyze the Ensemble Learning Methods
	R20C310.4	Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning
	R20C310.5	Discuss the Neural Network Models and Fundamentals concepts of Deep Learning
R20C311 Compiler Design	R20C311.1	Understanding the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler
	R20C311.2	Understanding the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler.
	R20C311.3	Introduction of Syntax Analyzer of compilers by describing the methods for translating a formal language to another formal language.
	R20C311.4	Understanding the basic principles of compiler design, its various constituent parts, algorithms and data structures required to be used in the compiler
	R20C311.5	Demonstrate the code generator is a compiler that translates the intermediate representation of the source program into the target program.
R20C312	R20C312.1	Identify security attacks, services, mechanisms and apply the knowledge of mathematics in cryptographic algorithms.
	R20C312.2	Make use of symmetric key cryptographic algorithms to perform cryptographic operations.

Cryptography And Network Security	R20C312.3	Make use of asymmetric key cryptographic algorithms to perform cryptographic operations.
	R20C312.4	Analyze different digital signature algorithms to achieve authentication.
	R20C312.5	Analyze security issues in Transport Layer, Network Layer and Application Layers and Examine appropriate security protocols
R20C315 Machine Learning Using Python Lab	R20C315.1	Understand the mathematical and statistical prospective of machine learning algorithms
	R20C315.2	Design and evaluate the unsupervised models through python in built functions system
	R20C315.3	Evaluate the machine learning models preprocessed through various feature engineering algorithms by python
	R20C315.4	Design and apply various reinforcement algorithms to solve real time complex problems and Understand the basic concepts of deep neural network model and design the same
R20C316 Compiler Design Lab	R20C316.1	A Lexer takes the modified source code which is written in the form of sentences . In other words, it helps you to convert a sequence of characters into a sequence of tokens.
	R20C316.2	The main goal of syntax analysis is to create aabstract syntax tree (AST) of the source code, which is a hierarchical representation of the source code that reflects the grammatical structure of the program.
	R20C316.3	Semantic Analysis makes sure that declarations and statements of program are semantically correct
	R20C316.4	The code optimization in the synthesis phase is a program transformation technique, which tries to improve the intermediate code by making it consume fewer resources
	R20C316.5	A code generator is a compiler that translates the intermediate representation of the source program into the targetprogram
R20C317 Cryptography And Network Security Lab	R20C317.1	Apply the knowledge of symmetric cryptography to implement encryption and decryption using Ceaser Cipher, Substitution Cipher, Hill Cipher
	R20C317.2	Demonstrate the different algorithms like DES, BlowFish, and Rijndael, encrypt the text ? Hello world? using Blowfish Algorithm
	R20C317.3	Analyze and implement public key algorithms like RSA, DiffieHellman Key Exchange mechanism, the message digest of a text using the SHA-1 algorithm
R20C318A Bigdata	R20C318A.1	Develop MapReduce Programs to analyze large dataset Using Hadoop and Spark ? To Study of Big Data Analytics and Hadoop Architecture ? Installation of Hadoop and cluster management
	R20C318A.2	Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components File management tasks & Basic linux commands Mapreducing
	R20C318A.3	Perform the filter, count, distinct, map, flatMap RDD Operations in Spark. ? Implementing MatrixMultiplication with Hadoop Map-reduce ? Compute Average Salary and Total Salary by Gender for an Enterprise

	R20C318A.4	Build Queries using Spark SQL ? (i) Creating hive tables Create a sql table of employees Employee table with id,designation Salary table (salary ,dept id) ? Create external table in hive with similar schema of above tables,
	R20C318A.5	Apply Spark joins on Sample Data Sets (i) Pyspark Definition(Apache Pyspark) (ii) Pyspark -RDD?S (i) what is RDD? s?
R20C318B Mean Stack Technologies Module-I	R20C318B.1	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.
	R20C318B.2	Utilize JavaScript for developing interactive HTML web pages and validate form data.
	R20C318B.3	Build a basic web server using Node.js and also work with Node Package Manager (NPM).
	R20C318B.4	Build a web server using Express.js
	R20C318B.5	Make use of Typescript to optimize JavaScript code by using the concept of strict type checking.
R20C319 Employability Skills	R20C319.1	Apply and solve various basic mathematical problems by using different methods
	R20C319.2	Applying strategies in problem solving by minimizing time consumption using shortcuts
	R20C319.3	Use their logical thinking and analytical abilities to solve quantitative aptitude questions from company specific and other competitive tests.
	R20C319.4	Solving confidentially any problems and utilizing these skills in both personal and professional life
	R20C319.5	Analyze, Summarize and present information in quantitative forms including tables and formulas
R20C313A Mobile Computing	R20C313A.1	To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
	R20C313A.2	To discuss the typical mobile networking infrastructure through a popular GSM protocol networks, namely MAC layer, Network Layer & Transport Layer
	R20C313A.3	To e-plain and identify the issues of various layers of mobile
	R20C313A.4	To infer and give eamples on database issues & data delivery models in mobile environments
	R20C313A.5	To distinguish and summarize the ad hoc networks and related concepts, discuss and use various platforms and protocols used in mobile environment
R20C313C Object Oriented Analysis And Design	R20C313C.1	Understand and Analyze the nature of complex system and its solutions
	R20C313C.2	Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships.
	R20C313C.3	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
	R20C313C.4	Analyze & Design behavioral aspects of a Software System using Use Case, Interaction and Activity Diagrams.
	R20C313C.5	Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioral aspects and Runtime environment of Software Systems.

R20C314B Mean Stack Development	R20C314B.1	Build static web pages using HTML5 elements.
	R20C314B.2	Apply JavaScript to embed programming interface for web pages and also to perform Client-side validations.
	R20C314B.3	Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js.
	R20C314B.4	Develop JavaScript applications using typescript and work with document database using MongoDB.
	R20C314B.5	Utilize Angular JS to design dynamic and responsive web pages.
IV-I & IV-II Courses		
COURSE CODE	CO NUMBER	COURSE OUTCOME
R19C401 Cryptography and Network Security	R19C401.1	Identify different types of security attacks, services, mechanisms and classical encryption techniques
	R19C401.2	Apply the knowledge of mathematics of cryptography and Make use of symmetric key Cryptographic algorithms to perform cryptographic operations
	R19C401.3	Apply the knowledge of mathematics of cryptography and Make use of asymmetric key Cryptographic algorithms to perform cryptographic operations
	R19C401.4	Analyze security issues in Network Layer and Examine appropriate security protocols
	R19C401.5	Analyze security issues in transport layer and Examine appropriate security protocols & firewalls
R19C402 UML and Design Patterns	R19C402.1	Illustrate software design with UML diagrams and Design software applications using OO concepts
	R19C402.2	Design documentation for the purpose of capturing software requirements, specification, and outlining the testable and complete design of a simple program
	R19C402.3	Develop plans to limit risks specific to software designed for use in a particular social context
	R19C402.4	Apply UML based software design into pattern based design using Creational & Structural design patterns
	R19C402.5	Apply UML based software design into pattern based design using Behavioral design patterns
R19C403 Machine Learning	R19C403.1	Identify concept learning, version spaces and candidate elimination algorithm
	R19C403.2	Develop decision tree learning and Experimental Evaluation of Learning Algorithms
	R19C403.3	Apply Dimensionality reduction techniques and Rule Learning
	R19C403.4	Explain Artificial neural networks and support vector machine
	R19C403.5	Apply Bayesian learning and Instance based learning
R19C404 Energy Audit	R19C404.1	Describe the policies and conservation Techniques of Energy Efficiency
	R19C404.2	Explain energy conservation in HVAC systems
	R19C404.3	Propose compensation techniques for power factor improvement
	R19C404.4	Discriminate suitable measuring instrument and lighting system

	R19C404.5	Compute various costing techniques of investment and capital recovery for effective management
R19C405D Internet of Things	R19C405D.1	Describe the usage of the term 'the internet of things' in different contexts
	R19C405D.2	Discover the various network protocols used in IoT and familiar with the key wireless technologies used in IoT systems, such as Wi-Fi, 6LoWPAN, Bluetooth and ZigBee
	R19C405D.3	Define various communication technologies and communication protocols for IoT
	R19C405D.4	Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software
	R19C405D.5	Understand Transactions and Business Processing in the Internet of Things
	R19C405D.6	Build and test a complete working IoT system
R19C405E Software Project Management	R19C405E.1	Explain the basic concepts and issues of software project management, how to effectively plan the project and improving software economics
	R19C405E.2	Illustrate the project approach by old and new methods, iterative process and artifacts of process
	R19C405E.3	Interpret the software workflows of the process, checkpoints of process
	R19C405E.4	Distinguish iterative process planning , project organization and responsibilities
	R19C405E.5	Examine and control the project progress, cost, issues, status report?s and automation issues
R19C406B Cloud Computing	R19C406B.1	Defining the cloud computing models and services and major challenges for cloud computing
	R19C406B.2	Categorize some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications
	R19C406B.3	Determine the system virtualization techniques and explain the role of scheduling
	R19C406B.4	Deduce about the Evolution of storage technology and gather the risk factors in cloud security
	R19C406B.5	Validating the financial, technological, and organizational capacity of employer?s for actively initiating and installing cloud-based applications
R19C407 UML and Design Patterns Lab	R19C407.1	Create use case documents that capture requirements for a software system
	R19C407.2	Create class diagrams that model both the domain model and design model of a software system
	R19C407.3	Create sequential and parallel activities in a process and identifies events, states, and behavior of an object
	R19C407.4	Identify the deployment of software elements to the physical architecture and identify the behavior in terms of provided and required interfaces
R19C408 Project1	R19C408.1	Apply Process of Project Development to Analyze and design the real world problem
	R19C408.2	Demonstrate the proficiency of Computer Programming Languages & Other Emerging technologies & Tools for Project Implementation
	R19C408.3	Deploy the software in the real environment to satisfying the functional and non functional requirements

R19C409 IPR and Patents	R19C409.1	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP
	R19C409.2	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development
	R19C409.3	Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development
	R19C409.4	Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation
	R19C409.5	Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing
R19C403A DevOps	R19C403A.1	Enumerate and Study SDLC phases and Agile model
	R19C403A.2	Describe DevOps & DevSecOps methodologies and their key concepts
	R19C403A.3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
	R19C403A.4	Set up complete private infrastructure using version control systems and CI/CD tools
	R19C403A.5	Acquire the knowledge of maturity model, Maturity Assessment
R19C410 Entrepreneurship	R19C410.1	Get the awareness on Entrepreneurship concept
	R19C410.2	Get the awareness on industrial policies
	R19C410.3	Gain the competency of preparing business plans
	R19C410.4	Study the impact of launching small business
	R19C410.5	Understand the recourse planning and market selection for startups
R19C420 Management and Organizational Behavior	R19C420.1	Understanding the concept of management, functions and organizational structure
	R19C420.2	Put forth the concepts of functional management
	R19C420.3	Understanding concepts of strategic management such as SWOT analysis, corporate planning
	R19C420.4	Familiarized with the concepts of perception Personality development and can equip with motivational theories
	R19C420.5	Attain the group performance and grievance handling in managing the organizational culture

Department of Information Technology

COURSE CODE	CO NUMBER	COURSE OUTCOME
[I-I] R20C101 Communicative English	R20C101.1	Employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.
	R20C101.2	Form sentences using proper grammatical structures and correct word forms.
	R20C101.3	Recognize paragraph structure and be able to match beginnings, endings and headings with paragraphs.
	R20C101.4	Assess social, cultural and environmental issues with a scientific point of view.
[I-I] R20C102 Mathematics - I	R20C102.1	Test the convergence of an infinite series
	R20C102.2	Apply ODE of first Order and first Degree to various engineering fields
	R20C102.3	Apply Linear Differential Equations of higher order with constant coefficients to various engineering fields.
	R20C102.4	Utilize Partial differentiation in optimization of functions of several variables.
	R20C102.5	Apply Double and Triple integration techniques in evaluating areas and volumes of bounded regions.
[I-I] R20C103 Applied Physics	R20C103.1	Distinguish the phenomena of light- Interference, diffraction, polarization and determine the wavelength of given light using these phenomena.
	R20C103.2	Apply the concepts of light in optical fiber and lasers in communication system.
	R20C103.3	Calculate the energy of quantum particle at different energy levels and differentiate solids based on the band theory.
	R20C103.4	Classify the magnetic materials and apply the magnetic, dielectric materials for given engineering applications
	R20C103.5	Classify the semiconductors and study the properties of superconductors
[I-I] R20C104 Programming for Problem Solving using C	R20C104.1	Practice fundamentals of C programming language with tokens and evaluation of expressions to write solutions for problems
	R20C104.2	Use different operators, control statements to write programs that use selection and loop constructs
	R20C104.3	Apply concepts like arrays, strings, structures, and unions
	R20C104.4	Analyze pointers concepts with different pointer applications.
	R20C104.5	Illustrate writing programs with functions and concepts of File I/O.
[I-I] R20C105 Computer Engineering Workshop	R20C105.1	Identify, assemble and update the components of a computer and able to Install of system software, Troubleshoot the PC Hardware and Software issues.
	R20C105.2	Operate basic command line interface commands on Linux and Interpret the network configuration, internet access by using different browsers and able to install software

	R20C105.3	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTeX
	R20C105.4	Make use of tools for converting pdf to word and vice versa
	R20C105.5	Illustrate IoT fundamentals, applications, protocols, communication models, architecture, IoT devices
[I-I] R20C106 English Communication Skills Laboratory	R20C106.1	Identify and pronounce consonants and vowel sounds as per the International Phonetic Alphabet.
	R20C106.2	Speak fluently by practicing accent, rhythm and intonation
	R20C106.3	Make oral presentations on different topics - individually or in groups with confidence, clarity and conviction.
	R20C106.4	Employ suitable reading strategies to get the general idea of a text and draft reports
[I-I] R20C107 Applied Physics Lab	R20C107.1	Examine the physical properties of light using interference and diffraction.
	R20C107.2	Calculate the numerical aperture and acceptance angle of optical fiber
	R20C107.3	Analyze the characteristics of semiconducting materials
	R20C107.4	Demonstrate the magnetizing behaviour of magnetic materials
	R20C107.5	Calculate the dielectric constant of a material
[I-I] R20C108 Programming for Problem Solving using C Lab	R20C108.1	Demonstrate C basic programming concepts like tokens, operators, datatypes, qualifiers to develop programs
	R20C108.2	Apply control statements with selection and loop constructs
	R20C108.3	Apply concepts of arrays, strings, structures, and unions.
	R20C108.4	Apply pointers, applications of pointers programs
	R20C108.5	Practice programs on functions and concepts of File I/O.
[I-II] R20C109 Mathematics – II	R20C109.1	Develop matrix techniques to find Eigen values and Eigen vectors
	R20C109.2	Apply Eigen values and Eigen vectors to reduce a quadratic form to canonical form by orthogonal transformation, and to singular value decomposition of a matrix
	R20C109.3	Apply iterative methods to solve algebraic equation/transcendental equation/system of linear equations
	R20C109.4	Interpolate data using various interpolating techniques.
	R20C109.5	Apply numerical techniques to find derivatives/to evaluate integrals/to solve initial value problems of first order, first degree ODE.
[I-II] R20C110 Applied Chemistry	R20C110.1	Elucidate polymerization techniques and identify suitable polymer material for a given engineering application.
	R20C110.2	Describe the working of primary cells, secondary cells and recognize control methods for standard types of corrosion.

	R20C110.3	Explicate characteristics, preparation methods and applications of advanced materials (Semiconductors, Insulators, Magnetic materials, Nanomaterials, Liquid crystals and Super conductors).
	R20C110.4	Acquaint about principles, applications of analytical techniques and non- conventional energy sources
	R20C110.5	Understand the basics of computational chemistry and importance of molecular machines.
[I-II] R20C111 Computer Organization	R20C111.1	Analyze various number systems and relate postulates of Boolean algebra and minimize combinational functions.
	R20C111.2	Examine and analyze combinational and sequential circuits.
	R20C111.3	Examine the computer arithmetic, microinstructions, and organization.
	R20C111.4	Analyze the microprogrammed control and central processing unit.
	R20C111.5	Analyze the memory organization and input-output organization.
[I-II] R20C112 Python Programming	R20C112.1	Understand the concepts of Python, Data types, Python expressions, operators in python
	R20C112.2	Understand control statements, strings handling and text files
	R20C112.3	Apply different data structures lists, tuples and dictionaries in python for solving problems.
	R20C112.4	Apply operations on files, object-oriented concepts using case studies.
	R20C112.5	Develop graphical user interface and Error handling exceptions
[I-II] R20C113 Data Structures	R20C113.1	Understand the concept of data structures and solve the problems by applying searching, sorting techniques
	R20C113.2	Applying the knowledge of linked list data structure to solve the problems
	R20C113.3	Solve the problems by applying the knowledge on stack and queues data structure and evaluate the expressions using stack data structure
	R20C113.4	Examine the properties of trees and construct various trees using efficient algorithms
	R20C113.5	Examine the properties of graphs and solve the problems by applying the knowledge on graphs theory
[I-II] R20C114 Applied Chemistry Lab	R20C114.1	Handle Conductivity meter, Colorimeter, PH-meter and Potentiometer for analysis of materials using small quantities involved for quick and accurate results.
	R20C114.2	Carry out acid- base titrations for Standardization of acids and estimation of alkalinity present in the given samples.
	R20C114.3	Calculate the quantity of ferrous ion and Manganese ions by using redox titrations.
	R20C114.4	Perform quantitative interpretations of titration and be familiar with the concept of hardness, turbidity and total dissolved salts in water sample.
	R20C114.5	Demonstrate the chemistry of iodine as direct and indirect oxidizing agent.
	R20C115.1	Identify Python programming environment and to design python

[I-II] R20C115 Python Programming Lab	R20C115.2	Execute the conditional expressions and looping statements
	R20C115.3	Apply lists, tuples and dictionaries in python for solving problems.
	R20C115.4	Able to Write functions and pass arguments in python and Design object-oriented programs with python classes
	R20C115.5	Develop a graphical front end to your program and apply testing software
[I-II] R20C116 Data Structures Lab	R20C116.1	Solve the problems by applying various searching and sorting techniques
	R20C116.2	Solve fundamental algorithmic problems by implementing data structures such as stacks, queues and linked list
	R20C116.3	Implement traversal techniques and find minimum cost sparing trees by using data structures tree and graphs
[I-II] R20C117 Environment Science	R20C117.1	Describe various environmental issues from an interdisciplinary perspective and regulation of ecosystems.
	R20C117.2	Recognize sustainable usage of natural resources in global concern
	R20C117.3	Interpret the importance of biodiversity and maintain ecological balance.
	R20C117.4	List out various types of environmental pollution, their control methods and discuss about solid waste management techniques.
	R20C117.5	Ascertain the environmental legislations to control the social issues and paraphrase the proposed methodologies for environmental management
[II-I] R20C201 Mathematics - III	R20C201.1	Interpret the physical meaning of different operators such as gradient, curl and divergence and find the work done against a field, circulation and flux. using vector calculus
	R20C201.2	Apply the Laplace transform for solving Initial value problems.
	R20C201.3	Compute the Fourier series of periodic signals and applying integral expressions for the forward and inverse Fourier transforms
	R20C201.4	Form PDEs and solve first order PDEs
	R20C201.5	Identify solution methods for PDEs of higher order that model physical processes
[II-I] R20C202 Object Oriented Programming through C++	R20C202.1	Classify object-oriented programming and procedural programming and identify the importance of OOP
	R20C202.2	Build C++ classes and objects by using functions, constructors and destructors
	R20C202.3	Apply C++ features such as inheritance and polymorphism
	R20C202.4	Examine Pointers and binding in C++ to solve the problems
	R20C202.5	Build C++ programs using Generic Programming and exception handling and Identify Standard Template Library in C++
[II-I] R20C203 Operating Systems	R20C203.1	Identify the functional aspects and implementation methods (system call and system programs) of different modules in a general purpose operating system
	R20C203.2	Analyze scheduling algorithms and inter-process communication methods of processes handled by operating systems through examples.
	R20C203.3	Distinguish various memory management strategies such as paging and segmentation, virtual memory, swapping and page replacement algorithms.

	R20C203.4	Categorize deadlock detection and recovery, deadlock prevention and avoidance algorithms. Examine the disk structure, disk scheduling and storage implementation.
	R20C203.5	Distinguish various security measures and system protection techniques.
[II-I] R20C204 DataBase Management Systems	R20C204.1	Illustrate Databasemanagement System alongwith architecture
	R20C204.2	Construct ER diagrams andconvert ER diagrams intoRDBMS and also implement Relationalmodel with constraints
	R20C204.3	Analyze different forms ofSQL queries
	R20C204.4	Analyze different schema refinements(normalizations)
	R20C204.5	Summarize Transactions,Concurrency control withlocking and recovery Management and Demonstrate Externalstorage and indexing
[II-I] R20C205 Discrete Mathematics and Graph Theory	R20C205.1	Define the concepts of Sets, Relations and Functions, and the concepts of Graph theory.
	R20C205.2	Understand the concepts of Propositions, their notations and normal forms and predicate calculus, and the concepts of lattice, and different types Algebraic structures ,graph and tree representations
	R20C205.3	Apply the concept of proposition calculus and Predicate calculus solve problems, Algebraic structures and recurrence relations
	R20C205.4	Make use of Combinatorics theorems and tree algorithms solved different problems and recurrence relations
	R20C205.5	Model graphs and Trees using the concepts of theorems and Algorithms
[II-I] R20C206Object Oriented Programming through C++ Lab	R20C206.1	Build c++ classes and objects by using functions, constructors and destructors.
	R20C206.2	Apply c++ features such as inheritance and polymorphism.
	R20C206.3	Develop c++ programs using pointers, Generic programming and exception handling
[II-I] R20C207 Operating Systems Lab	R20C207.1	Make use of Linux environment for Unix utilities and perform basic shell and file access control
	R20C207.2	Solve various CPU Scheduling and page replacement algorithms
	R20C207.3	Distinguish the Banker's algorithm implementation for deadlock avoidance and prevention.
	R20C207.4	Survey the process communication, process synchronization and usage of pthread library.
[II-I] R20C208 Database Management Systems Lab	R20C208.1	Write queries for creation, dropping, altering, view of tables, DML operations, access operations, built- in functions, operators, sub queries and nested queries in databases.
	R20C208.2	Implement PL/SQL programs using control structures, Exceptions, procedures, functions, packages, triggers, cursors, forms, reports.
[II-I] R20C209 SKILL ORIENTED COURSE - I ANIMATIONS-	R20C209.1	Learn various tools of digital 2-D animation.
	R20C209.2	understand production pipeline to create 2-D animation.
	R20C209.3	Analyze special effects in animation to bring interest and awe in the scenes and backgrounds.
	R20C209.4	Apply the tools to create 2D animation for films and videos.

2D ANIMATION		
[II-I] R20C210 Constitution of India	R20C210.1	Understand the History and features of Indian constitution
	R20C210.2	Explain the roles of President and Prime Minister, Structure of supreme court and High court
	R20C210.3	Discuss the structure and functions of state secretariat
	R20C210.4	Describe Zillapanchayat block level organisation
	R20C210.5	Explain the roles of Election Commission, SC/ST/OBC and women commissions
[II-II] R20C211 Statistics with R	R20C211.1	Show R installation and Summarize different R data structures
	R20C211.2	Apply R programming constructs in solving different problems
	R20C211.3	Apply different Math functions and different functions for I/O operations in R.
	R20C211.4	Experiments with different graphic functions in R, Solve probability distributions, correlation and covariance problems
	R20C211.5	Apply different linear and non-linear regression models
[II-II] R20C212 Principles of Software Engineering	R20C212.1	Understand phases of software development and conventional software methods
	R20C212.2	Identify the software requirements of a given project and then develop usecases
	R20C212.3	Transform Scenarios into Object-Oriented Design
	R20C212.4	Transform an Object-Oriented Design into high quality Design
	R20C212.5	Skills to design, implement, and execute test cases at the Unit and Integration level
[II-II] R20C213 Automata Theory and Compiler Design	R20C213.1	Ability to design, develop, and implement a compiler for any language
	R20C213.2	Able to use LEX and YACC tools for developing a scanner and a parser
	R20C213.3	Able to design and implement Syntax directed translation, Intermediate code
	R20C213.4	Able to design and implement LL and LR parsers
	R20C213.5	Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity
[II-II] R20C214 Java Programming	R20C214.1	Comprehending basic concepts of java programming like tokens, control statements
	R20C214.2	Applying concepts of class, object, methods and constructors in java
	R20C214.3	Analyzing different dimensional arrays, types of inheritance in java. Examine interfaces with default, static methods along with annotations
	R20C214.4	Evaluating different built in packages and exception handling mechanisms in java
	R20C214.5	Applying String handling functions, Multithreading and JDBC connectivity in java
[II-II] R20C215 Managerial Economics and	R20C215.1	Describe the concept of managerial economics, Demand function, and different methods of demand forecasting
	R20C215.2	Discuss the concepts of production function , economies of scale, optimum size of the firm, cost & break even analysis
	R20C215.3	Describe market structure and pricing under varied market conditions, Classify the types of business organizations and business cycles

Financial Accountancy	R20C215.4	Prepare financial statements for analysis by using accounting tools.
	R20C215.5	Evaluate the projects by applying tools and techniques of capital budgeting to accept or reject the new projects in business.
[II-II] R20C216 UML Lab	R20C216.1	Create use case documents that capture requirements for a software system
	R20C216.2	Create class diagrams that model both the domain model and design model of a software system
	R20C216.3	Create sequential and parallel activities in a process and identifies events, states, and behavior of an object.
	R20C216.4	Identify the deployment of software elements to the physical architecture and identify the behavior in terms of provided and required interfaces.
[II-II] R20C217 FOSS Lab	R20C217.1	Demonstrate UNIX commands for file handling and process control
	R20C217.2	Construct regular expressions for pattern matching and apply them to various filters for a specific task.
	R20C217.3	Analyze a given problem and apply requisite facets of shell programming in order to devise a shell script to solve the problem
[II-II] R20C218 Java Programming Lab	R20C218.1	Applying basic concepts primitive data type, Operations, Expressions, Control-flow, Strings in java
	R20C218.2	Illustrating Class, Objects, Methods, Inheritance and types of Inheritance in java
	R20C218.3	Creating applications using Exception handling
	R20C218.4	Creating applications using Multi-Threading and Packages in java
	R20C218.5	Developing GUI applications in java
[II-II] R20C219 MongoDB Lab	R20C219.1	Understand Installation, configuration and setup of the drivers to use MongoDB.
	R20C219.2	Create collections , documents and gain an in-depth knowledge of MongoDB connections
	R20C219.3	Apply advanced querying to retrieve data in the database
[III-I] R20C301 Computer Networks	R20C301.1	Demonstrate different types of network and models for networking links OSI, TCP/IP
	R20C301.2	Determine data link layer services, functions and protocols like HDLC and PPP.
	R20C301.3	Compare and Classify medium access control protocols like random access, controlled access and channelization protocols.
	R20C301.4	Distinguish the routing algorithms and congestion control algorithms
	R20C301.5	Determine the features and operations of transport and application layer protocols
[III-I] R20C302 Design and Analysis of Algorithms	R20C302.1	Analyze the performance of algorithms and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
	R20C302.2	Describe the divide-and-conquer paradigm, greedy paradigm and explain when an algorithmic design situation calls for it.
	R20C302.3	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
	R20C302.4	Analyze Backtracking, branch and bound algorithms
	R20C302.5	Analyze NP- Completeness theory, lower bound theory and String matching algorithms.
[III-I] R20C303 Data	R20C303.1	Understand Data warehouse system , Data Mining and OLAP tools
	R20C303.2	Demonstrate different data preprocessing techniques on a given data/data set for aligning the data

Mining Techniques	R20C303.3	Apply the appropriate classification technique to perform classification, model building, and evaluation
	R20C303.4	Analyze the use of association rule techniques on frequent item set generation
	R20C303.5	understand and Analyze various cluster algorithms
[III-I] R20C304B DevOps	R20C304B.1	Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility.
	R20C304B.2	Describe DevOps & DevSecOps methodologies and their key concepts
	R20C304B.3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
	R20C304B.4	Set up complete private infrastructure using version control systems and CI/CD tools
	R20C304B.5	Acquire the knowledge of maturity model, Maturity Assessment
[III-I] R20C305A Artificial Intelligence	R20C305A.1	Classify different types of AI systems, applications, languages and current trends.
	R20C305A.2	Identify various AI search algorithms (Un-informed, Informed, Heuristic, Constraint Satisfaction) , problem reduction and game playing applications.
	R20C305A.3	Apply the logic concepts - proportional logic, axiomatic system, predicate logic.
	R20C305A.4	Categorize working knowledge of representation using semantic network , extended semantic network ,script structure and semantic web.
	R20C305A.5	Analyze expert systems, Truth Maintenance System
[III-I] R20C306 Data Mining Techniques with R Lab	R20C306 .1	Extract data from files and other sources and perform various data manipulation tasks on them
	R20C306 .2	Use R graphics & Tables to visualize results of various statistical operations on data
	R20C306 .3	Analyze data by using data mining algorithms and techniques such as clustering, association mining, classification and prediction.
[III-I] R20C307 Computer Networks Lab	R20C307.1	Understand Network devices used in different types of networks
	R20C307.2	Implement the protocols to now how reliable data communication is achieved through data link layer.
	R20C307.3	Implement appropriate routing algorithm for the network and know how to control congestion.
	R20C307.4	Work on various network management tools
[III-I] R20C308B CI and CD using DevOps Lab	R20C308B.1	Understand the why, what and how of DevOps adoption
	R20C308B.2	Attain literacy on Devops
	R20C308B.3	Align capabilities required in the team
	R20C308B.4	Create an automated CICD pipeline using a stack of tools
	R20C309.1	Understand corporate etiquette

[III-I] R20C309 Employability Skills-I	R20C309.2	Make presentations effectively with appropriate body language
	R20C309.3	Be composed with a positive attitude
	R20C309.4	Understand the core competencies to succeed in professional and personal life
[III-I] R20C310 Summer internship	R20C310	Summer internship
[III-I] R2031019 Community Service Project	R2031019	Community Service Project
[III-II] R20C311 Machine Learning	R20C311.1	Apply the fundamental usage of the concept Machine Learning system
	R20C311.2	Apply various regression Technique
	R20C311.3	Applying the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
	R20C311.4	Develop Machine Learning algorithms to solve real world problems
	R20C311.5	Applying the Neural Network Models and Fundamentals concepts of Deep Learning
[III-II] R20C312 Big Data Analytics	R20C312.1	Illustrate big data challenges in different domains including social media, transportation, finance and medicin
	R20C312.2	Use various techniques for mining data stream
	R20C312.3	Design and develop Hadoop
	R20C312.4	Identify the characteristics of datasets and compare the trivial data and big data for various applications
	R20C312.5	Explore the various search methods and visualization techniques
[III-II] R20C313 Cryptography and Network Security	R20C313 .1	Identify security attacks, services, mechanisms and apply the knowledge of mathematics in cryptographic algorithms
	R20C313 .2	Perform cryptographic operations by using symmetric key cryptographic algorithms and solve the problems using number theory
	R20C313 .3	Apply different Asymmetric key cryptographic algorithms to solve problems related to confidentiality and authentication and analyse the performance and different cryptanalytic attacks on public encryption systems
	R20C313 .4	Analyze the performance of different message digest algorithms for integrity and authentication
	R20C313 .5	Analyze different attacks on networks and the performance of security protocols like PGP ,S/MIME, SSL,TSL, and Ipsec
[III-II] R20C314C Design Patterns	R20C314C.1	Explain how Design Patterns Solve Design Problems
	R20C314C.2	Explain different Creational Patterns
	R20C314C.3	Explain different Sturctural Pattrens
	R20C314C.4	Explain different Behavioural Pattrens
	R20C314C.5	Explain what to expect from Design Patterns

[III-II] R20C315C Data Communications	R20C315C.1	Understand the importance of data communication, the Layered architecture of Open System Interconnection (OSI) and Transmission Control Protocol / Internet Protocol (TCP/IP) models.
	R20C315C.2	Understand conversion of signals from Digital to Digital, Analog to Digital & Digital to Analog conversion, bandwidth utilization techniques.
	R20C315C.3	Understand Error detection and correction techniques, Flow control & error control and DLC services.
	R20C315C.4	Understand operations of Channelization protocols, Random Access protocols and Wired & Wireless LAN.
	R20C315C.5	Understand the working of 802.11, Cellular Telephony, Bluetooth, IPv4 and IPv6 Addresses.
[III-II] R20C316 Big Data Analytics lab	R20C316.1	Implement the basics of data structures like Linked list, stack, queue, set and map in Java.
	R20C316.2	The knowledge of big data analytics and implement different file management task in Hadoop, Map Reduce Paradigm and develop data applications using variety of systems.
	R20C316.3	To perform different operations on data using Pig Latin scripts, apply different operations on relations and databases using Hive
[III-II] R20C317 Machine Learning using Python Lab	R20C317.1	Implement procedures for the machine learning algorithms
	R20C317.2	Design and Develop Python programs for various Learning algorithms
	R20C317.3	Apply appropriate data sets to the Machine Learning algorithms
	R20C317.4	Develop Machine Learning algorithms to solve real world problems
[III-II] R20C318 Cryptography and Network Security Lab	R20C318 .1	Apply the knowledge of symmetric cryptography to implement encryption and decryption using Ceaser Cipher, Substitution Cipher, Hill Cipher
	R20C318 .2	Apply the different algorithms like DES, BlowFish, and Rijndael, encrypt the text 'Hello world?' using Blowfish Algorithm.
	R20C318 .3	Analyze and implement public key algorithms like RSA, Diffie-Hellman Key Exchange mechanism, the message digest of a text using the SHA-1 algorithm,, Digital signature standard
[III-II] R20C319 Natural Language Processing	R20C319.1	Explore natural language processing (NLP) libraries in Python
	R20C319.2	Learn various techniques for implementing NLP including parsing & text processing
	R20C319.3	Understand how to use NLP for text feature engineering
[III-II] R20C320 Employability skills-II	R20C320.1	Apply and solve various basic mathematical problems by using different methods
	R20C320.2	Applying strategies in problem solving by minimizing time consumption using shortcuts
	R20C320.3	Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests
	R20C320.4	solving confidentially any problems and utilizing these skills in both personal and professional life
	R20C320.5	Analyze , summarize and present information in quantitative forms including tables and formulas
[VI-I] R19C401 Cryptography	R19C401.1	Identify security attacks, services, mechanisms and apply the knowledge of mathematics in cryptographic algorithms
	R19C401.2	Perform cryptographic operations by using symmetric key cryptographic algorithms and solve the problems using number theory

and Network Security	R19C401.3	Apply different Asymmetric key cryptographic algorithms to solve problems related to confidentiality and authentication and analyse the performance of different message digest algorithms for integrity and authentication
	R19C401.4	Analyze different attacks on networks and evaluate the performance of security protocols like PGP ,S/MIME, IPsec
	R19C401.5	Analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, TLS and SSH
[VI-I] R19C402 Machine Learning	R19C402.1	Identify concept learning, version spaces and candidate elimination algorithm.
	R19C402.2	Develop decision tree learning and Experimental Evaluation of Learning Algorithms.
	R19C402.3	Apply Dimensionality reduction techniques and Rule Learning.
	R19C402.4	Explain Artificial neural networks and support vector machine.
	R19C402.5	Explain Artificial neural networks and support vector machine.
[VI-I] R19C403 Advanced Computer Networks	R19C403.1	Demonstrate reference models with layers, protocols and interfaces.
	R19C403.2	Determine the routing algorithms, Sub netting and Addressing of IP V4and IPV6.
	R19C403.3	Compare and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation
	R19C403.4	Distinguish the concepts Wireless LANS, WIMAX, IEEE 802.11.
	R19C403.5	Determine to Cellular telephony and Satellite networks.
[VI-I] R19C404E Energy Audit(OE-II)	R19C404E.1	To understand energy efficiency, scope, conservation and technologies.
	R19C404E.2	To design energy efficient lighting systems.
	R19C404E.3	To estimate/calculate power factor of systems and propose suitable compensation techniques
	R19C404E.4	To understand energy conservation in HVAC systems
	R19C404E.5	To calculate life cycle costing analysis and return on investment on energy efficient technologies
[VI-I] R19C405D Cloud Computing(PE-III)	R19C405D.1	Classify the types of computing techniques , key dimensions of the challenge of Cloud Computing and Parallel and Distributed Systems
	R19C405D.2	Identify different Cloud Infrastructures and Applications Paradigms of cloud
	R19C405D.3	Identify the system virtualization techniques outline its role in enabling the cloud computing system model and Cloud Resource Management and Scheduling
	R19C405D.4	Categorize the different storage systems & technologies enabled with large models ,file systems which accelerates the technology behind the lead corporate like Amazon and Google and Cloud Security a top concern for cloud users
	R19C405D.5	Make use of the financial, technological, and organizational capacity of employers for actively initiating and installing cloud-based applications.Organize some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.
	R19C406B.1	Understand SDLC phases and Agile model
	R19C406B.2	Understand DevOps and key concepts of DevOps

[VI-I] R19C406B DevOps(PE-IV)	R19C406B.3	Understand DevOps adoption in projects and tool stack implementation
	R19C406B.4	Understand how to implement CI/CD pipeline tools
	R19C406B.5	Understand DevOps Maturity Model and key factors
[VI-I] R19C406D Data Science(PE-IV)	R19C406D.1	Analyze the concepts of python programming
	R19C406D.2	Explain the statistical models in Data Science
	R19C406D.3	Analyze Getting and working with data and probability distribution
	R19C406D.4	Analyze Machine Learning Concepts
	R19C406D.5	Analyze Getting and working with data and probability distribution
[VI-I] R19C407 Unified Modeling Language (UML) Lab	R19C407.1	Create use case documents that capture requirements for a software system
	R19C407.2	Create class diagrams that model both the domain model and design model of a software system
	R19C407.3	Create sequential and parallel activities in a process and identifies events, states, and behavior of an object.
	R19C407.4	Identify the deployment of software elements to the physical architecture and identify the behavior in terms of provided and required interfaces.
[VI-I] R19C408 Project –I	R19C408	Project
[VI-I] R19C409 IPR & Patents	R19C409.1	Understand importance of IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents
	R19C409.2	Get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements
[VI-II] R19C410 Management and Organizational Behavior	R19C410.1	Describe the concept of management, functions and organizational structure
	R19C410.2	Put forth the concepts of functional management
	R19C410.3	Knowledge on concepts of strategic management such as SWOT analysis ,corporate planning
	R19C410.4	Familiarized with the concepts of perception Personality development and can equip with motivational theories.
	R19C410.5	Attain the group performance and grievance handling in managing the organizational culture.
[VI-II] R19C411B Environmental Pollution & Control	R19C411.1	Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
	R19C411.2	Selection of an appropriate EIA methodology
	R19C411.3	Evaluation of impacts on environment
	R19C411.4	Evaluation of risk assessment
	R19C411.5	Know the latest acts and guidelines of MoEF & CC
[VI-II] R19C412A Deep Learning	R19C412.1	Develop mathematical foundation of neural network.
	R19C412.2	Describe the machine learning basics.
	R19C412.3	Compare the different architectures of deep neural network.
	R19C412.4	Build a Convolution Neural Network

	R19C412.5	Build a Convolution Neural Network
[VI-II] R19C413 Project	R19C413	Project



IQAC, Coordinator




Principal
Principal

DHANEKULA INSTITUTE
OF ENGINEERING AND TECHNOLOGY
Ganguru, Vijayawada-521 139