G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

COURSE OUTCOMES, PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

DEPARTMENT OF CIVIL ENGINEERING	
COURSE OUTCOMES (R20 Regulation)	
Course-I	
Course Code:	A30002
Course Title:	MATHEMATICS – I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
CO-2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO-3	Utilize mean value theorems to real life problems.
CO-4	Familiarize with functions of several variables which is useful in optimization.
CO-5	Apply important tools of calculus in higher dimensions and will become familiar with 2- dimensional coordinate systems.
CO-6	Analyze 3- dimensional coordinate systems and utilization of special functions.
Course-2	
Course Code:	A30003
Course Title:	ENGINEERING PHYSICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply mechanics for solving engineering problems
CO-2	Apply the principles of acoustics for noise cancellation and in designing buildings
CO-3	Analyse the applications of ultrasonics in various engineering fields
CO-4	Explain the principles of physics in dielectrics and magnetic materials
CO-5	Interpret the concepts of lasers and optical fibers in various applications
CO-6	Elucidate the applications of superconductors and nanomaterilas
Course-3	
Course Code:	A30501
Course Title:	PYTHON PROGRAMMING

Theory/ Laboratory: Theory	
Course Outcomes	
CO-1	Comprehend the fundamental concepts of computer hardware and problem solving Abilities.
CO-2	Knowledge on the basic concepts of algorithms, flow charts and python programming.
CO-3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.s
CO-4	Interpret the importance of functions in programming
CO-5	Analyze and modularize the problem and its solution by using functions.
CO-6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications.
Course-4	
Course Code:	A30001
Course Title:	COMMUNICATIVE ENGLISH
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Remember the concepts which the student has learnt previously and identifying their connection
CO-2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO-3	Apply grammatical structures to formulate sentences and correct word forms
CO-4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO-5	Evaluate reading/listening texts and to write summaries based on global Comprehension of these texts.
CO-6	Create a coherent paragraph interpreting a figure/graph/chart/table
Course-5	
Course Code:	A30301
Course Title:	ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO-2	Apply orthographic projection concepts to draw projections of points, lines,

	planes and solids.
CO-3	Apply development concepts to draw development of surfaces of simple solids.
CO-4	Apply isometric projection concepts to draw isometric projections of right regular solids
CO-5	Apply orthographic projection concepts to convert isometric view to orthographic views.
CO-6	Make use of AutoCAD Software to draw 2D diagrams of various objects

Course-6	
Course Code:	A30006
Course Title:	COMMUNICATIVE ENGLISH LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO-2	Apply communication skills through various language learning activities
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO-4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO-5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO-6	Improve upon speaking skills over telephone, role plays and public speaking

Course-7	
Course Code:	A30007
Course Title:	ENGINEERING PHYSICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Estimate the mechanical properties of materials
CO-2	Determine moment of inertia of a flywheel
CO-3	Measure the velocity of ultrasonics in liquid by applying the basic concepts of ultrasonics
CO-4	Determine the wavelength of laser, particle size, numerical aperture and acceptance angle by applying the principles of lasers and optical fibre

CO-5	Measure the elastic constants, Poisson's ratio of the material
CO-6	Measure the strain of the metal bar by using strain gauge.
Course-8	
Course Code:	A30502
Course Title:	PYTHON PROGRAMMING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design solutions to mathematical problems & Organize the data for solving the Problem.
CO-2	Understand and implement modular approach using python
CO-3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc.
CO-4	Understands about files and its applications.
CO-5	Develop real-world applications, files and exception handling provided by python
CO-6	Select appropriate programming construct for solving the problem
Course-9	
Course Code:	A30010
Course Title:	MATHEMATICS – II
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the mathematical principles to solve second and higher order differential equations.
CO-2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO-3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO-4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
CO-5	Analyze the vector calculus involving divergence, curl and their properties alongwith vector identities.
CO-6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.
Course-IO	

Course Code:	A30012
Course Title:	ENGINEERING CHEMISTRY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.
CO-2	To differentiate between pH metry, Potentiometric and conductometric titrations.
CO-3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO-4	Understand the principles of different analytical instruments and explain their applications.
CO-5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO-6	Explain of different types of colloids, their preparations, properties and applications
Course-11	
Course Code:	A30505
Course Title:	C AND DATA STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply fundamental programming concepts of C for solving general purpose problems.
CO-2	Implement functions for organized software development.
CO-3	Apply various operations on linear data structures.
CO-4	Design techniques for efficient searching and sorting of a given application.
CO-5	Develop programs on stacks and Queues for real time applications
CO-6	Analyze Linear and nonlinear programming for efficiency.
Course-12	
Course Code:	A30303
Course Title:	ENGINEERING MECHANICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the basic concepts of rigid bodies subjected to different types of loads and supports.
CO-2	Analyze the motion of the bodies considering friction and external loads.

CO-3	Determine centroids, centre of gravity, moment of inertia of simple and composite figures.
CO-4	Analyze the motion of particle without considering forces and considering forces, develop equations for different motions.
CO-5	Apply Newton's laws and conservation laws to elastic collisions and motion of rigid bodies.
CO-6	Analyze the perfect frames using different methods and concepts of Mechanical vibrations.
Course-13	
Course Code:	A30302
Course Title:	ENGINEERING WORKSHOP
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply wood working skills to make products.
CO-2	Perform metal cutting operations in the fitting section to make models.
CO-3	Perform simple welding operations to join to metal pieces.
CO-4	Apply sheet metal working skills to make required models.
CO-5	Evaluate the performance analysis of various pumps and turbines.
CO-6	Perform general maintenance works on own at house/ work place.
Course-14	
Course Code:	A30013
Course Title:	ENGINEERING CHEMISTRY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Determine the cell constant and conductance of solutions
CO-2	Prepare advanced polymer materials.
CO-3	Determine the physical properties like surface tension, adsorption and viscosity
CO-4	Estimate the Iron and Calcium in cement
CO-5	Calculate the hardness of water and calculation of dissolved oxygen percentages
CO-6	Determination of percentage of Iron in Cement sample by colorimetry
Course-15	
Course Code:	A30506
Course Title:	C AND DATA STRUCTURES LABORATORY

Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Develop fundamental programs in C for solving general purpose problems.
CO-2	Implement functions for reusability and easy maintenance
CO-3	Apply various operations on linear data structures.
CO-4	Design techniques for efficient searching and sorting of a given application.
CO-5	Develop programs on stacks and Queues for real time applications.
CO-6	Apply Linear and nonlinear programming for efficiency.
Course-16	
Course Code:	A30304
Course Title:	APPLIED MECHANICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Acquire knowledge of static and dynamic behaviour of the bodies.
CO-2	Verify the Principle of moments using the bell crank lever apparatus.
CO-3	Determine velocity ratio, mechanical advantage and efficiency of single and double gear crab
CO-4	Determine the velocity ratio of the machine and to interpret the law of machine
CO-5	Analyze the coefficient of static friction between two surfaces
CO-6	Apply laws of mechanics to determine efficiency of simple machines with consideration of friction
Course-17	
Course Code:	A30032
Course Title:	UNIVERSAL HUMAN VALUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
CO-2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO-3	Understand the value of harmonious relationship based on trust and respect in their life and profession

CO-4	4 Understand the role of a human being in ensuring harmony in society and nature.
CO-5	5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
CO-6	Analyze the value of maintaining ethical values in critical situations
Course-I8	
Course Code:	A30014
Course Title:	TRANSFORM TECHNIQUES AND NUMERICAL METHODS
Theory/ Laboratory:	Theory

Course Outcomes	
CO-1	Apply Laplace transforms to solve ordinary differential equations.
CO-2	Build Fourier series and Fourier transforms of a given function.
CO-3	Apply numerical methods to solve algebraic and transcendental equations.
CO-4	Derive interpolating polynomials using interpolation formulae
CO-5	Solve differential and integral equations numerically
Course-19	
Course Code:	A30101
Course Title:	STRENGTH OF MATERIALS–I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret simple stresses and strains to find out various properties of materials
CO-2	Develop bending moment and shear force diagrams of beams subjected to different loading conditions
CO-3	Compute flexural and shear stresses across various sections to plot the stress distribution envelops
CO-4	Apply various theorems such as Mohr's, Double integration, Conjugate beam etc., to find slope and deflections of beams
CO-5	Analyze the direct and bending stresses on various structural elements for stability conditions
Course-20	
Course Code:	A30102
Course Title:	SURVEYING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Compute linear measurement and angles using compasses, chain to prepare plans and maps
CO-2	Determine elevations of station points along the irregular intervals to prepare

	contour maps and to calculate the volume of earth work
CO-3	Measure horizontal angles by Theodolite for a traverse to find areas and elevations
CO-4	Apply surveying principles for setting out simple curves by using different methods and compare fixed and movable hair method in tachometric surveying
CO-5	Make use of advanced surveying instruments to solve Construction problems
Course-21	
Course Code:	A30701
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO-2	Analyze the demand, production, cost and break even to know inter relationship among variables and their impact
CO-3	Classify the market structure to decide the fixation of suitable price
CO-4	Apply capital budgeting techniques to select best investment opportunity
CO-5	Analyze and prepare financial statements to assess financial health of business
Course-22	
Course Code:	A30103
Course Title:	FLUIDS MECHANICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Make use of conservation laws of mass, momentum and energy to find properties of fluids
CO-2	Compute the force of buoyancy on submerged and floating bodies to locate metacentre
CO-3	Apply Euler's and Bernoulli's equation to find the characteristics of fluid in motion
CO-4	Identify various flow measuring devices to find the coefficient of discharge
CO-5	Evaluate minor and major energy losses to solve complex pipe network systems
Course-23	
Course Code:	A30104
Course Title:	STRENGTH OF MATERIALS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	

CO-1	Experiment with different types of materials to find the mechanical properties
CO-2	Determine the Brinell and Rockwell hardness number to find the hardness of given specimen
CO-3	Analyze elastic constants of spring and beam to design structural members
CO-4	Determine toughness of materials using Charpy and Izod test
CO-5	Prove Maxwell's reciprocal theorem for its validity on beams
Course-24	
Course Code:	A30105
Course Title:	SURVEYING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Make use of conventional surveying instruments in plotting of a layout
CO-2	Determine horizontal and vertical angles by Theodolite for a given traverse
CO-3	Compute the difference in elevations using various levelling Instruments
CO-4	Utilize Rankine's and two Theodolite methods to plot curves
CO-5	Experiment with total station to find fundamental measurements accurately in the field
Course-25	
Course Code:	A30106
Course Title:	FLUID MECHANICS LABORATORY
Theory/ Laboratory:	Laboratory
CO-1	Calibrate flow measuring devices to check the rate of flow
CO-2	Prove the validity of Bernoulli equation when applied to fluid flow patterns
CO-3	Conduct experiments on flow measuring devices to find coefficient of discharge
CO-4	Gain knowledge to calculate and design engineering applications involving fluid
Course-26	
Course Code:	A30107
Course Title:	BUILDING CONSTRUCTION AND PLANNING
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify suitable materials to be used for construction works
CO-2	Apply Building Bye-Laws and Regulations with respect to classification of buildings based on occupancy
CO-3	Plan Residential and Public Buildings as per the requirements
CO-4	Draw the conventional signs of doors, windows, ventilators and various materials

CO-5	Generate plan, elevation, section of single storey and Multi-storey buildings as per the given requirements
Course-27	
Course Code:	A30031
Course Title:	ENVIRONMENTAL SCIENCE
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Solve environmental problems through higher level of personal involvement and interest.
CO-2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO-3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
C0-4	Apply environmental laws for the protection of environment and wildlife.
C0-5	Influence society in proper utilization of goods and services
Course-28	
Course Code:	A30011
Course Title:	PROBABILITY AND STATISTICS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Adopt correlation methods and principle of least squares, regression analysis
C0-2	Apply discrete and continuous probability distributions
C0-3	Classify the concepts of data science and its importance
C0-4	Interpret the association of characteristics & through correlation & regression tools
C0-5	Design the components of a classical hypothesis test
C0-6	Infer the statistical inferential methods based on small and large sampling tests
Course-29	
Course Code:	A30108
Course Title:	HYDRAULICS AND HYDRAULIC MACHINERY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply Chezy's and Manning's equation to find geometric properties of channels
C0-2	Analyze specific energy and flow conditions to find critical depth in various channels
C0-3	Determine the characteristics of hydraulic jump in channels using momentum and

	specific energy equations
C0-4	Evaluate force exerted by the jet of water on stationary and moving plates to understand the working principles of turbine
C0-5	Assess the characteristics of hydraulic turbines and pumps to find the efficiency
Course-30	
Course Code:	A30109
Course Title:	STRENGTH OF MATERIALS – II
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Assess an inclined section to find principal stresses and strains using analytical and graphical methods
C0-2	Design different types of shafts and springs subjected to torsion
CO-3	Analyze failure of columns and struts for various end conditions by calculating the crushing load
CO-4	Apply various theories of failure on the structural members for safe design
CO-5	Design thin and thick cylinders subjected to fluid pressure
Course-31	
Course Code:	A30110
Course Title:	STRUCTURAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret various energy theorems to find deflections in beams
CO-2	Analyze the statically indeterminate members for various loading conditions
CO-3	Develop shear force and bending moment diagrams for fixed and continuous beams
CO-4	Apply Clapeyron's three moment theorem to find end and intermediate moments
CO-5	Analyze indeterminate beams with and without support settlements using slopedeflection and moment distribution met
Course-32	
Course Code:	A30111
Course Title:	WATER RESOURCES ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret rainfall data using different methods

CO-2	Apply various methods to estimate surface and ground water hydrology components
CO-3	Build the knowledge to connect hydrology with respect to field requirement
CO-4	Design irrigation channels using silt theories
CO-5	Classify various hydraulic structures involved in cross drainage works
Course-33	
Course Code:	A30112
Course Title:	COMPUTER AIDED DRAWING LAB-I
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Make use of different tools in AutoCAD to draw regular and irregular shapes
C0-2	Modify existing drawings as per client requirements using necessary commands
C0-3	Develop a plan, section and elevation of various structures to implement on site
C0-4	Apply computer aided drawings to find sectional properties of structural components
C0-5	Create 3D drawings from 2D plan of various buildings for architectural purposes
Course-34	
Course Code:	A30113
Course Title:	ENGINEERING GEOLOGY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Identify various minerals and rocks by their origin and properties
C0-2	Apply geological features influencing rock masses and discontinuities
C0-3	Measure strike and dip of the bedding planes
C0-4	Interpret geological maps to represent the distribution of rocks and minerals
Course-35	
Course Code:	A30114
Course Title:	HYDRAULIC MACHINERY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Calibrate flow measuring devices to check the rate of flow
C0-2	Prove the validity of Bernoulli equation when applied to fluid flow patterns
C0-3	Conduct experiments on flow measuring devices to find coefficient of discharge
C0-4	Measure the impact forces produced by jet of water striking on flat and curved

	surfaces
C0-5	Test basic performance parameters of hydraulic turbines and pumps
Course-36	
Course Code:	A30115
Course Title:	BASIC REMOTE SENSING AND GIS
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Distinguish the characteristics of satellites, platforms & sensors used in acquisition of remote sensing data.
C0-2	Apply the concepts of Electro Magnetic energy spectrum and spectral signature curves in the practical problems
C0-3	Apply GIS in land use, disaster management, ITS and resource information system
C0-4	Interpret data for water resource applications
C0-5	Apply remote sensing and GIS in various civil engineering applications
R20 REGULATIONS	
Course-37	
Course Code:	A30116
Course Title:	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Make use of Indian Standard code provisions in designing reinforced concrete structures
C0-2	Apply limit state design for serviceability, deflection and cracking
C0-3	Justify the various modes of failure in reinforced concrete members
C0-4	Design various reinforced concrete members to meet different loading conditions
C0-5	Develop the reinforcement detailing drawings of concrete members to implement on site
Course-38	
Course Code:	A30117
Course Title:	GEOTECHNICAL ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Evaluate the index and engineering properties of the soil
C0-2	Determine the stress distributions in the founded soil
C0-3	Analyze the compressibility of soils to obtain the coefficients

C0-4	Calculate the bearing capacity of soils and foundation settlements
CO-5	Estimate load carrying capacity of pile and pile
Course-39	
Course Code:	A30118
Course Title:	ENVIRONMENTAL ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Distinguish the physical, chemical and biological properties of the water samples
CO-2	Interpret various treatments for drinking water, waste water and solid waste
CO-3	Design treatment plants by forecasting population for drinking water, waste water and solid waste
CO-4	Select appropriate distribution layout for municipal water supply
CO-5	Measure and propose control measures for noise and air pollution in the environment
Course-40	
Course Code:	A30119
Course Title:	SOIL MECHANICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Determine the index properties of the soil
CO-2	Evaluate the engineering properties of the soil
CO-3	Assess the sub grade strength of roads and pavements
CO-4	Measure the co efficient of permeability for cohesive and non-cohesive soils
CO-5	Estimate the shear strength under controlled drainage conditions
Course-41	
Course Code:	A30120
Course Title:	ENVIRONMENTAL ENGINEERING LAB
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Discuss the importance of water and its quality analysis
CO-2	Analyze various physico-chemical parameters of water in case of quality requirements

CO-3	Assess complete water quality for domestic supplies
CO-4	Suggest various types of treatment methods required to purify raw water with different contaminants
CO-5	Analyze biological parameters of water in case of quality requirements
Course-42	
Course Code:	A30121
Course Title:	CONSTRUCTION PLANNING AND PROJECT MANAGEMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Build knowledge on roles and responsibilities of a project manager
CO-2	Plan the construction facilities to expedite project activities
CO-3	Develop schedule of activities to complete the construction project on time
CO-4	Analyse and implement safety practices in construction industry
CO-5	Create tender and contract document for a construction project
Course-43	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a better understanding of important issues related to gender in contemporary India
CO-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
CO-3	Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4	Equip to work and live together as equals
CO-5	Develop a sense of appreciation of women in all walks of life
Course-44	
Course Code:	A30151
Course Title:	ADVANCED STRUCTURAL ANALYSIS
Theory/ Laboratory:	Theory

Course Outcomes	
CO-1	Interpret structural actions in statically determinate and indeterminate structures
CO-2	Analyze three hinged arches, continuous beams and portal frames using displacement method of analysis
CO-3	Apply flexibility and stiffness method of analysis for two span continuous beams subjected to sinking of supports
CO-4	Determine support reactions, shear forces and bending moments in beams and frames subjected to vertical and lateral loads
CO-5	Assess the collapse mechanism and energy absorption capacity of fixed and continuous beams

Course-45	
Course Code:	A30152
Course Title:	GREEN BUILDINGS
Theory / Laboratory:	Theory

Course Outcomes	
CO-1	Describe the importance and necessity of green building
CO-2	Assess a building on the norms available for green building
CO-3	Suggest materials and technologies to improve energy efficiency of building
CO-4	Develop buildings which use minimal natural resources during construction and maintenance
CO-5	Distinguish conventional and eco-friendly method of construction

Course-46	
Course Code:	A30153
Course Title:	WATERSHED MANAGEMENT
Theory/ Laboratory:	Theory

Course Outcomes	
CO-1	Understand the concepts of watershed management and its effect on land, water and ecosystem resources
CO-2	Suggest technical measures for soil erosion control both due to water and wind
CO-3	Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey
CO-4	Suggest drought control measures, water conservation structures, including design
CO-5	Formulate and solve deterministic optimization models for design and operation of water resources systems
CO-6	Develop control and mitigation techniques for watershed problems

Course-47	
Course Code:	A30154
Course Title:	DISASTER MANAGEMENT AND MITIGATION

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Classify different kind of hazards/disasters and their effects on environment
CO-2	Analyze the causes of hazards/disasters which effects human life
CO-3	Apply disaster management strategies through engineering applications
CO-4	Apply emerging approaches in disaster management to reduce effect of disasters
Course-48	
Course Code:	A30281
Course Title:	FUNDAMENTALS OF ELECTRICAL ENGINEERING
Theory / Laboratory:	Theory
Course Outcomes	
CO-1	Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.
C0-2	Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.
C0-3	Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.
C0-4	Test the Performance of DC machines, AC machines and single-phase transformers.
Course-49	
Course Code:	A30122
Course Title:	CONCRETE TECHNOLOGY
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Evaluate the properties and the quality of the concrete materials
C0-2	Measure the fresh and hardened properties of concrete
C0-3	Classify various special concretes based on their performance
C0-4	Assess the effects of physical properties of concrete
C0-5	Design concrete mixes for various field applications
Course-50	
Course Code:	A30123
Course Title:	DESIGN OF STEEL STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	

C0-1	Estimate strength of welds and bolts to find the efficiency of various connections
C0-2	Design and detail tension and compression members under different conditions adopting IS Code
C0-3	Analyze and design flexural members as per code provisions
C0-4	Design built-up compression members and slab bases with necessary connections
C0-5	Apply IS code of practice to design various components of welded steel plate girder
Course-51	
Course Code:	A30124
Course Title:	TRANSPORTATION ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Develop a strong analytical and practical knowledge of highway planning

CO-2	Apply theories of transportation engineering to design pavements
CO-3	Classify various highway geometrical design elements
CO-4	Apply traffic regulations for intersection design
CO-5	Design flexible and rigid pavements as per IRC guidelines
Course-52	
Course Code:	A30125
Course Title:	CONCRETE TECHNOLOGY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Evaluate various properties of cement and aggregate
CO-2	Determine compressive strength of concrete by using non-destructive tests
CO-3	Design concrete mix as per the site conditions and specifications of materials Available
CO-4	Assess the mechanical properties of concrete
Course-53	
Course Code:	A30126
Course Title:	TRANSPORTATION ENGINEERING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify basic engineering properties of various materials
CO-2	Determine the grade and properties of bitumen
CO-3	Conduct traffic studies for estimating traffic flow characteristics
CO-4	Design traffic signals using Webster method
CO-5	Evaluate longitudinal and cross-section details of roads
Course-54	
Course Code:	A30127
Course Title:	CAD LABORATORY –II
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Evaluate beams with different loading conditions
CO-2	Analyze trusses and portal frames
CO-3	Develop building component models
CO-4	Design footings for residential and commercial structures
CO-5	Analyze and design cantilever retaining wall
Course-55	
Course Code:	A30128

Course Title:	ESTIMATION COSTING AND VALUATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop knowledge on various Building items, their standard units and principles
CO-2	Apply quantity of each item for RCC buildings by different methods of estimation
CO-3	Evaluate various types of contracts, valuations, tenders and specifications
CO-4	Apply rates and bill preparation for different building elements
CO-5	Acquire valuation of assets
Course-56	
Course Code:	A30033
Course Title:	INDIAN CONSTITUTION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Explain the role of President and Prime Minister.
CO-3	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-4	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO-5	Analyze the decentralization of power between central, state and local self-government.
CO-6	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
R19 REGULATION	
Course-52	
Course Code:	A2131
Course Title:	GROUND IMPROVEMENT TECHNIQUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Suggest the appropriate ground improvement technique as per the requirement
CO-2	Classify the various densification methods in granular and cohesive soils
CO-3	Implement the stabilization methods to improve soil properties for engineering a better working platform for construction
CO-4	Interpret the concept reinforced Earth Walls and Geo-synthetics
CO-5	Identify the problems in Expansive soils
Course-53	
Course Code:	A2132

Course Title:	TRANSPORTATION ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a strong analytical and practical knowledge of highway planning
CO-2	Apply theories of transportation engineering to design pavements
CO-3	Classify various highway geometrical design elements
CO-4	Apply traffic regulations for intersection design
CO-5	Design flexible and rigid pavements as per IRC guidelines
Course-54	
Course Code:	A2133
Course Title:	DESIGN OF STEEL STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-l	Estimate strength of welds and bolts to find the efficiency of various connections
CO-2	Design and detail tension and compression members under different conditions adopting IS Code
CO-3	Analyze and design flexural members as per code provisions
CO-4	Design built-up compression members and slab bases with necessary connections
CO-5	Apply IS code of practice to design various components of welded steel plate girder
Course-55	
Course Code:	A1134
Course Title:	DESIGN OF STEEL STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Estimate strength of welds and bolts to find the efficiency of various connections
CO-2	Design and detail tension and compression members under different conditions adopting IS Code
CO-3	Analyze and design flexural members as per code provisions
CO-4	Design built-up compression members and slab bases with necessary connections
CO-5	Apply IS code of practice to design various components of welded steel plate girder
Course-56	
Course Code:	A2134
Course Title:	TRANSPORTATION ENGINEERING LABORATORY
Theory/ Laboratory:	Laboratory

Course Outcomes	
CO-1	Identify basic engineering properties of various materials
CO-2	Determine the grade and properties of bitumen
CO-3	Conduct traffic studies for estimating traffic flow characteristics
CO-4	Design traffic signals using Webster method
CO-5	Evaluate longitudinal and cross-section details of roads
Course-57	
Course Code:	A1136
Course Title:	HIGHWAY MATERIALS TESTING LABORATORY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify engineering properties of various materials
CO-2	Determine elongation, flash point for various grades of bitumen
CO-3	Conduct traffic studies for estimating traffic flow characteristics
CO-4	Determine hardness for various aggregates
CO-5	Evaluate longitudinal and cross-section details of railways
Course-58	
Course Code:	A1163
Course Title:	PRESTRESSED CONCRETE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Enumerate the various methods of pre-stressing to analyze the post and pre tensioning systems
CO-2	Design various pre-stressed concrete structural elements
CO-3	Compute losses of pre-stress due to long term properties of concrete
CO-4	Analyze and design the sections to withstand shear and flexure
CO-5	Predict short term and long term deflections to comply with the limit state of deflection
Course-59	
Course Code:	A1164
Course Title:	GROUND IMPROVEMENT TECHNIQUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Suggest the appropriate ground improvement technique as per the requirement
CO-2	Classify the various densification methods in granular and cohesive soils
CO-3	Implement the stabilization methods to improve soil properties for engineering a

	better working platform for construction
CO-4	Interpret the concept reinforced Earth Walls and Geo-synthetics
CO-5	Identify the problems in Expansive soils
Course-60	
Course Code:	A1165
Course Title:	WATERSHED MANAGEMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the concepts of watershed management and its effect on land, water and ecosystem resources
CO-2	Suggest technical measures for soil erosion control both due to water and wind
CO-3	Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey
CO-4	Suggest drought control measures, water conservation structures, including design
CO-5	Formulate and solve deterministic optimization models for design and operation of water resources systems
CO-6	Develop control and mitigation techniques for watershed problems
Course-61	
Course Code:	A1166
Course Title:	ENVIRONMENTAL IMPACT ASSESSMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Enumerate the various methods of pre-stressing to analyze the post and pre tensioning systems
CO-2	Design various pre-stressed concrete structural elements
CO-3	Compute losses of pre-stress due to long term properties of concrete
CO-4	Analyze and design the sections to withstand shear and flexure
CO-5	Predict short term and long term deflections to comply with the limit state of deflection
Course-62	
Course Code:	A1167
Course Title:	MAINTENANCE AND REPAIR OF STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop knowledge on various distress and damages to concrete and masonry structures
CO-2	Apply quantity of each item of structures, types and properties of repair materials

CO-3	Apply Non-Destructive Testing techniques to field problems.
CO-4	Apply cost effective retrofitting strategies for repairs in buildings
CO-5	Assessing damage to structures and various repair techniques
Course-63	
Course Code:	A1168
Course Title:	URBAN TRANSPORTATION PLANNING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a strong analytical and practical knowledge in urban mobility
CO-2	Apply theories of transportation planning to design urban roads
CO-3	Classify economic impacts of new transportation plans
CO-4	Apply traffic assignment regulations to urban modes
CO-5	Acquire knowledge on trip generation and distribution
Course-64	
Course Code:	A1169
Course Title:	DESIGN AND DRAWING OF IRRIGATION STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the concepts of fluid mechanics to analyze an irrigation structure
CO-2	Design various irrigation structures like head and cross regulator structure
CO-3	Understand different aspects of design of hydraulic structures
CO-4	Identify various types of reservoirs and their design aspects
CO-5	Design and draw the structural details of hydraulic structures
Course-65	
Course Code:	A1170
Course Title:	SOLID WASTE MANAGEMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Explain municipal solid waste management systems with respect to its physical properties, and associated critical considerations in view of emerging
CO-2	Outline sources, types and composition of solid waste with methods of handling, sampling and storage of solid waste
CO-3	Select the appropriate method for solid waste collection, transportation, redistribution and disposal.
CO-4	Describe methods of disposal of hazardous solid waste

PROGRAM OUTCOMES(R18Regulation)

Program Outcomes	
PO-1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO-3	Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural , societal, and environmental considerations.
PO-4	Conduct investigations of complex problems: use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO-5	Modern tool usage: create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and 26rganizat to complex engineering activities with an understanding of the limitations.
PO-6	The engineer and society: apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO-7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO-8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO-9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO-10	Communications: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give receive clear instructions.
PO-11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO-12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PROGRAM SPECIFIC OUTCOMES (R18 Regulation)	
Program Specific Outcomes	
PSO-1	Competent in the fundamentals of engineering science, analytical and quantitative reasoning and design in the context of civil engineering
PSO-2	Apply knowledge in technical areas appropriate to Civil Engineering, Conduct experiments, analyze and interpret data

PSO-3	Proficient to apply these skills in developing safe, sustainable, economical solutions to civil engineering problems either within the profession or through post-graduate research
PSO-4	Grow professionally in their careers through continued development of technical and management skills, achievement of professional licensure, and assumption of roles of responsibility in professional service

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING	
COURSE OUTCOMES (R20 Regulation)	
Course-I	
Course Code:	A30002
Course Title:	MATHEMATICS – I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical ApplicationS
CO-2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem..
CO-3	. Utilize mean value theorems to real life problems.
CO-4	Familiarize with functions of several variables which is useful in optimization.
CO-5	Apply important tools of calculus in higher dimensions and will become familiar with 2- dimensional coordinate systems.
CO-6	. Analyze 3- dimensional coordinate systems and utilization of special functions.
Course-2	
Course Code:	A30005
Course Title:	CHEMISTRY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box
CO-2	. To differentiate between Ph metry, Potentiometric and conductometric titrations
CO-3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO-4	. Understand the principles of different analytical instruments and explain their applications
CO-5	. Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO-6	Explain of different types of colloids, their preparations, properties and application
Course-3	
Course Code:	A30501

Course Title:	PYTHON PROGRAMMING

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	. Comprehend the fundamental concepts of computer hardware and problem solving Abilities.
CO-2	. Knowledge on the basic concepts of algorithms, flow charts and python programming.
CO-3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
CO-4	. Interpret the importance of functions in programming
CO-5	. Analyze and modularize the problem and its solution by using functions.
CO-6	. Ability to relate the concepts of strings, files and pre-processors to the real world Applications.
Course-4	
Course Code:	A30201
Course Title:	FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	. Understand the basic concepts of magnetic circuits, electro magnetism and Electrostatics
CO-2	Understand and analyse DC circuits and their transformations.
CO-3	Understand and analyse the concepts of AC fundamental circuits
CO-4	.Apply KCL and KVL for mesh and nodal analysis
CO-5	.Understand the Knowledge of electromagnetism and its principles.
CO-6	Understand the basic types of wires, cables, Batteries and wiring systems
Course-5	
Course Code:	A30302
Course Title:	ENGINEERING WORKSHOP
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	. Apply wood working skills to make products.
CO-2	Perform metal cutting operations in the fitting section to make models
CO-3	Perform simple welding operations to join to metal pieces

CO-4	. Apply sheet metal working skills to make required models
CO-5	. Evaluate the performance analysis of various pumps and turbines.
CO-6	. Perform general maintenance works on own at house/ work place
Course-6	
Course Code:	A30502
Course Title:	PYTHON PROGRAMMING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design solutions to mathematical problems & Organize the data for solving the Problem
CO-2	. Understand and implement modular approach using python
CO-3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations et
CO-4	Understands about files and its applications.
CO-5	Develop real-world applications, files and exception handling provided by python
C0-6	Select appropriate programming construct for solving the problem
Course-7	
Course Code:	A30009
Course Title:	CHEMISTRY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	. Understand the determine the cell constant and conductance ofsolutions
CO-2	Prepare advanced polymer materials.
CO-3	. Measure the strength of an acid present in secondary batteries
CO-4	. Understand and apply the Ph metric titrations.
CO-5	. Verify Lambert-Beer'slaw
CO-6	Potentiometry – determination of redox potentials and EMFs
Course-8	
Course Code:	A30202
Course Title:	FUNDAMENTALS OF ELECTRICAL ENGINEERING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	. Understand the basic concepts of electrical elements.
CO-2	. Understand and analyses the basic law

CO-3	Understand and apply the connections of series and parallel circuits
CO-4	. Understand and apply the KCL and KVL
CO-6	. Demonstration of parts of DC and AC Machine
Course-9	
Course Code:	A30010
Course Title:	MATHEMATICSII
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the mathematical principles to solve second and higher order differential equations.
CO-2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO-3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO-4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs
CO-5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities
CO-6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals
Course-IO	
Course Code:	A30004
Course Title:	APPLIED PHYSICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	. Interpret the properties of light waves and its interaction of energy with the matte
CO-2	Explain the principles of physics in dielectrics and magnetic material
CO-3	. Apply electromagnetic wave propagation in different guided media
CO-4	. Calculate conductivity of semiconductors
CO-5	Interpret the difference between normal conductor and super conductor
CO-6	. Elucidate the applications of nano materials
Course-11	
Course Code:	A30503
Course Title:	DATA STRUCTURES USING C
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	. Learn to choose appropriate data structure as applied to specified problem definition
CO-2	. Design and analyse linear and non-linear data structures.
CO-3	. Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
CO-4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
CO-5	Develop programs for efficient data 31rganization with reduce time complexity.
CO-6	. Evaluate algorithms and data structures in terms of time and memory complexity of basic operations
Course-12	
Course Code:	A30001
Course Title:	COMMUNICATIVE ENGLISH
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	. Remember the concepts which the student has learnt previously and identifying their connection
CO-2	. Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO-3	. Apply grammatical structures to formulate sentences and correct word form
CO-4	. Analyze discourse markers to speak clearly on a specific topic in informal discussion
CO-5	. Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO-6	Create a coherent paragraph interpreting a figure/graph/chart/table
Course-13	
Course Code:	A30301
Course Title:	ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO-2	Apply orthographic projection concepts to draw projections of points, lines, planes and solids.
CO-3	Apply development concepts to draw development of surfaces of simple solids.
CO-4	Apply isometric projection concepts to draw isometric projections of right regular solids
CO-5	Apply orthographic projection concepts to convert isometric view to orthographic views

CO-6	Apply orthographic projection concepts to convert isometric view to orthographic views
Course-14	
Course Code:	A30008
Course Title:	APPLIED PHYSICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Operate optical instruments like Travelling microscope and spectrometer
CO-2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO-3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO-4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO-5	Evaluate the acceptance angle of an optical fiber and numerical aperture
CO-6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor
Course-15	
Course Code:	A30504
Course Title:	DATA STRUCTURES LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Learn to choose appropriate data structure as applied to specified problem definition.
CO-2	Design and analyse linear and non-linear data structures.
CO-3	. Design algorithms for manipulating linked lists, stacks, queues, trees and graphs
O-4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
CO-5	Develop programs for efficient data 32rganization with reduce time complexity.
CO-6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
Course-16	
Course Code:	A30006
Course Title:	COMMUNICATIVE ENGLISH LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.

CO-2	Apply communication skills through various language learning activities
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO-4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO-5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO-6	Improve upon speaking skills over telephone, role plays and public speaking
Course-17	
Course Code:	A30031
Course Title:	ENVIRONMENTAL SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Solve environmental problems through higher level of personal involvement and interest.
CO-2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO-3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
CO-4	Apply environmental laws for the protection of environment and wildlife.
CO-5	Apply environmental laws for the protection of environment and wildlife
CO-6	Influence society in proper utilization of goods and services.
Course-IS	
Course Code:	A30015
Course Title:	TRANSFORM TECHNIQUES AND COMPLEX VARIABLES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply Laplace transforms to solve ordinary differential equations
CO-2	Build Fourier series and Fourier transforms of a given function
CO-3	Test for analyticity of complex functions in the given domain
CO-4	Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours
CO-5	Evaluate improper integrals of complex functions using Residue theorem.
Course-19	
Course Code:	A30205
Course	**ELECTRICAL CIRCUIT ANALYSIS**

Title:	
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply the theorems for complex circuits to calculate the voltage, current and power.
CO-2	Apply the fundamental knowledge of circuits to evaluate the various network parameters of D.C and A.C circuits.
CO-3	Analyze three phase circuits to determine line voltages, line currents, phase voltages and phase currents.
CO-4	Apply differential equation and Laplace transform techniques for transient response of series and parallel RLC circuits.
CO-5	Analyse the series and parallel resonance circuits and current locus diagrams.

Course-20	
Course Code:	A30206
Course Title:	ELECTRICAL MACHINES – I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the principles of AC and DC machines to identify a suitable electrical machine for a given application.
CO-2	Deduce the emf and torque equations of DC Machines and single phase transformers.
CO-3	Analyze the various characteristics of DC Machines, single phase and three phase transformers
CO-4	Test the performance of DC Machines and Single phase transformers
CO-5	Apply suitable starters and suitable test to control the speed of DC moto
Course-21	
Course Code:	A30207
Course Title:	ELECTROMAGNETIC FIELDS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	. Apply orthogonal coordinate systems for Electric and magnetic fields over the distribution of charge.
CO-2	Analyse the charge configurations of Electric and Magnetic fields using Coulombs law, Gauss'slaw, Biot-Savart's law, Ampere's circuital law and Poynting theorem.
CO-3	Evaluate the capacitance, Inductance and Magnetic forces for various conductors in Electromagnetic fields.
CO-4	Evaluate the capacitance, Inductance and Magnetic forces for various conductors in Electromagnetic fields.

CO-5	Analyse the plane wave equation in free space, dielectrics and conductors
Course-22	
Course Code:	A30410
Course Title:	ELECTRONIC CIRCUITS-I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the operation and characteristics of diodes and transistors
CO-2	Analyze various applications of diodes and transistors.
CO-3	Make use of Boolean algebra postulates to minimize Boolean functions.
CO-4	Construct and analyze various combinational and sequential circuits used in digital systems.
Course-23	
Course Code:	A30208
Course Title:	ELECTRICAL CIRCUITS AND SIMULATION LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Analyze RL and RC series circuits, 3 phase balanced and unbalanced system and power system network using PSPICE programmin
CO-2	Test the transient response of DC & AC series RLC circuits using PSPICE programmin
CO-3	Design the dual network, low pass and high pass filter using PSPICE programming.
CO-4	Simulate a given DC circuit using PSPICE programming.
Course-24	
Course Code:	A30209
Course Title:	ELECTRICAL MACHINES-I LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Determine the critical field resistance and critical speed of a DC Shunt generator.
CO-2	Plot the characteristics of DC shunt, Series and Compound generators using load test
CO-3	Test the performance of a given DC motor using suitable technique.
CO-4	Apply suitable test to calculate the losses for a given DC machine
Course-25	

Course Code:	A30411
Course Title:	Electronics Circuit-I Laboratory
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Analyze the description of CRO and Function generator panels.
CO-2	Determine cut-in, break-down voltages, static and dynamic resistances from V-I characteristics of electronic devices.
CO-3	Measure the ripple content present in rectifiers using with and without filters.
CO-4	Make use of small signal analysis to plot the characteristics of BJT and FET
CO-5	Make use of LabVIEW software to construct combinational and sequential circuits.
CO-6	Test and Debug the combinational and sequential circuits using LabVIEW Software.
Course-26	
Course Code:	A30210
Course Title:	FUNDAMENTALS OF PCB DESIGN
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Understand the significance of printed circuit board design
CO-2	Analyze various PCB components and their categories
CO-3	Understand the concept of development tools like OrCAD and PROTEUS
CO-4	Develop academic and industrial based projects using OrCAD and PROTEUS.
Course-27	
Course Code:	A30032
Course Title:	UNIVERSAL HUMAN VALUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
CO-2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc
CO-3	Understand the value of harmonious relationship based on trust and respect in their life and profession
C0-4	Understand the role of a human being in ensuring harmony in society and nature
C0-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work
C0-6	Analyze the value of maintaining ethical values in critical situations

Course-28	
Course Code:	A30020
Course Title:	NUMERICAL METHODS AND PROBABILITY THEORY
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	. Apply Numerical methods to solve algebraic and Transcendental equations using different methods and different conditions
C0-2	Apply various interpolation methods and finite difference concepts
C0-3	Perform numerical differentiation and numerical integration
C0-4	Apply Probability theory to find the chances of happening of events
C0-5	Apply Probability distribution to real time problems
Course-29	
Course Code:	A30019
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
C0-2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
C0-3	Classify the market structure to decide the fixation of suitable price
C0-4	Apply capital budgeting techniques to select best investment opportunit
C0-5	Analyze and prepare financial statements to assess financial health of business
Course-30	
Course Code:	A30212
Course Title:	Electrical Machines-II
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply the principles of AC machines to identify a suitable electrical machine for a given application.
C0-2	Deduce the power and torque equations ofInduction motors and synchronous machine
CO-3	Analyze the various characteristics of induction motors and synchronous machines.
CO-4	Test the performance of induction motors and synchronous machines.
CO-5	Apply a suitable test to control speed of Induction motors

Course-31	
Course Code:	A30213
Course Title:	CONTROL SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Determine the transfer function of a given system using different techniques
CO-2	Analyze the response of a given system in time and frequency domains
CO-3	Test the stability, observability and controllability of a given system.
CO-4	Apply suitable technique for calculating the gain margin and phase margin of a given system
Course-32	
Course Code:	A30419
Course Title:	ELECTRONIC CIRCUITS-II
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the characteristics and applications of operational amplifier
CO-2	Construct different active filters and oscillator circuits using op-amp and make use of IC 555 and PLL effectively in communication systems
CO-3	Analyze the concepts of combinational and sequential logic circuits and use them in the design of latches, counters using digital IC's.
CO-4	Distinguish between different signals and systems
CO-5	Analyze different signals by using an appropriate transform
Course-33	
Course Code:	A30214
Course Title:	ELECTRICAL MACHINES-II LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Test the performance of 1 phase Transformer, 3 phase induction motor and synchronous motor by conducting suitable test
C0-2	Determine circuit parameters of a 1 phase Transformer, 3 phase induction motor and synchronous motor by conducting suitable test.
C0-3	Apply Scott connection for the conversion of a 3 phase to 2 phase systems.
C0-4	Determine the regulation of a 3 phase alternator and 1 phase transformer by conducting suitable test
C0-5	Test the parallel operation and polarity test of a single phase transformer
Course-34	

Course Code:	A30215
Course Title:	CONTROL SYSTEM LABORATORY
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	. Plot the characteristics of AC servo motor, DC servo motor, synchro's and magnetic amplifier.
C0-2	. Determine the transfer function of DC machine and time domain specifications of second order system.
C0-3	Analyze the different logic gates using Programmable Logic Controller
C0-4	Analyze the stability of given system in time domain and frequency domain using MATLAB software.
C0-5	Test the effect of P, PD, PI, PID controller on a second order system.
Course-35	
Course Code:	A30420
Course Title:	ELECTONICS CIRCUITS-II LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Implement different configurations of operational amplifiers.
C0-2	Construct and analyze various active filters using op-amp.
C0-3	Design and draw the internal structure of various logic gates.
C0-4	Analyze the generation of operations of various signals and sequences using MATLAB.
Course-36	
Course Code:	A30216
Course Title:	PROGRAMABLE LOGIC CONTROLLERS
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Explain the operations and basic applications of PLCs using Switches.
C0-2	Acquire knowledge on usage of timers in different applications of PLCs
C0-3	Interpret the function of counters and apply counter in different applications of PLCs
C0-4	Understand the concepts of PLC Arithmetic Operations, data handling functions and apply the concepts in different applications of PLCs

R20 REGULATIONS

Course Code:	A30217

Course Title:	POWER SYSTEM TRANSMISSION AND DISTRIBUTION
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	. Apply the knowledge of electromagnetic fields to calculate the parameters of transmission lines and underground cables
C0-2	Analyze the performance of various transmission lines, underground cables and overhead Insulators
C0-3	. Design mechanical transmission lines using corona phenomenon, Sag and Tension.
C0-4	Analyze the distribution system, types of faults and protective devices.
Course-38	
Course Code:	A30218
Course Title:	POWER ELECTRONICS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Illustrate the fundamental concepts and techniques used in power electronic circuits
C0-2	Analyze the performance and protection techniques of power electronic devices.
C0-3	Analyze the operation and performance of AC-DC, DC-DC, DC-AC and AC-AC converters.
C0-4	Design a suitable power electronic converter circuit for given application
C0-5	Apply PWM techniques to improve the performance of DC-DC and DC-AC Converter
Course-39	
Course Code:	A30219
Course Title:	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Categorize various electrical instruments used for measuring electrical parameters
CO-2	Analyze the errors and compensations in various electrical measuring instrument
CO-3	Measure current, voltage, power and energy in 1-phase and 3-phase circuits.
CO-4	Estimate the unknown quantities of resistance, inductance and capacitance using bridges
CO-5	Apply transducers, digital meters and CRO for measuring electrical parameters
Course-40	

Course Code:	A30220
Course Title:	POWER ELECTRONICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Analyze the performance characteristics of SCR firing and commutation circuits.
CO-2	Plot the performance characteristics of AC-DC, DC-AC, DC-DC and AC-AC converters with R and RL Load
CO-3	Apply the knowledge of MATLAB to plot the characteristics of full converter, inverter and forced commutation circuits
Course-41	
Course Code:	A30221
Course Title:	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Estimate resistance, inductance and capacitance of electrical circuits using bridges and dielectric strength of transformer oil
CO-2	Calculate the percentage error of various measuring instruments, LVDT, and resistance strain Gauge
CO-3	Evaluate 3-Φ active power and reactive power of different loads
CO-4	Calibrate single phase energy meter and DC Crompton potentiometer.
Course-42	
Course Code:	A30222
Course Title:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design solutions for the problems of general purpose applications using object oriented Concepts.
CO-2	Generate reusable code using inheritance, user defined packages and interface
CO-3	Write robust and efficient code using exception handling and multithreading concept
CO-4	Implement collection frameworks and file handling techniques to store and retrieve data
CO-5	Design user interface using swings

Course-43	
Course Code:	A30033
Course Title:	INDIAN CONSTITUTION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Explain the role of President and Prime Minister
CO-3	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-4	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO-5	Analyze the decentralization of power between central, state and local self-government
CO-6	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
Course-44	
Course Code:	A30224
Course Title:	POWER SEMICONDUCTOR DRIVES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify a suitable electric drive system for desired application.
CO-2	Apply 1-phase & 3- phase controlled converters for speed control operation of DC drives.
CO-3	Apply the knowledge of DC-DC Converter and dual converter forspeed and torque control of DC Drives
CO-4	Apply the knowledge of AC voltage controller and cyclo-converter to control the speed of an induction motor and synchronous motor
Course-45	
Course Code:	A30225
Course Title:	POWER SYSTEM ANALYSIS
Theory / **Laboratory:**	Theory
Laboratory:	
Course Outcomes	
CO-1	Apply computational methods to determine transmission line parameters.
CO-2	Apply load flow methods to examine the load flow studies.
CO-3	Analyze symmetrical and unsymmetrical power system faults.
CO-4	Apply the methods to improve the steady state and transientstability of powersystems.

Course-46	
Course Code:	A30431
Course Title:	MICROPROCESSORS AND MICROCONTROLLER
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze 8086 microprocessor and MSP430 microcontroller architectures
CO-2	Develop programs using 8086 microprocessor and MSP430 microcontroller
CO-3	Make use of peripherals of MSP430 to interface I/O devices
CO-4	Apply serial communication protocols for interfacing serial device
CO-5	Design embedded applications using MSP430 microcontroller
Course-47	
Course Code:	A30226
Course Title:	POWER SYSTEMS SIMULATION LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Develop a program to simulate Ferranti effect
CO-2	Develop a program to model transmission lines
CO-3	Develop a program for formation Y-Bus and Z-Bus
CO-4	Develop a program for load flow solution
CO-5	Develop a program for short circuit analysis
CO-6	Develop a Simulink model for evaluating transientstability
Course-48	
Course Code:	A30227
Course Title:	ELECTRICAL DRIVES SIMULATION LABORATORY
Theory / Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply the knowledge of MATLAB and analyze the performance characteristics of DC and AC drives
C0-2	Evaluate the performance characteristics of inverter fed induction motor drive using MATLAB.
C0-3	Analyze the performance of electrical drives and design specifications.
Course-49	
Course Code:	A30434
Course Title:	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Develop assembly language programs using EMU8086 emulator.
C0-2	Execute 8086 ALPs for arithmetic, logical, string, call operations.
C0-3	Build programs of MSP430 using embedded C.
C0-4	Interface LEDs, push buttons, potentiometer to MSP430
C0-5	Test and debug 8086 ALPs and MSP430 embedded C programs.
Course-50	
Course Code:	A30228
Course Title:	DBMS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Design Database tables for the given problem
CO-2	Use appropriate querying processing technique to access the data
CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Develop PL/SQL routines for reusability of code
CO-5	Apply appropriate triggering concepts for automation and performance
Course-51	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a better understanding of important issues related to gender in contemporary India
CO-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
CO-3	Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4	Equip to work and live together as equals.
CO-5	Develop a sense of appreciation of women in all walks of life
Course-52	
Course Code:	A30251
Course Title:	SPECIAL ELECTRICAL MACHINES

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyse the performance of single phase motors, switched reluctance motors, stepper motors, permanent magnet synchronous motor, linear motors and servo motors
CO-2	Deduce the emf and torque equations of a single phase motors, stepper motor, switched reluctance motors, permanent magnet synchronous motor, servo motor, reluctance motor..
CO-3	Apply speed control techniques for switched reluctance motors, stepper motors, Permanent magnet Synchronous Motor, linear motors and servo motors.
CO-4	Plot the characteristics of single phase motors, switched reluctance motors, stepper motors, Permanent magnet Synchronous Motors, linear motors and servo motors.
Course-53	
Course Code:	A30252
Course Title:	ENERGY SOURCES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-l	Plot the layouts of different electrical power generating systems.
CO-2	Analyze the base load and peak load conditions to select suitable generating stations.
CO-3	Compare different types of tariffs suitable for different loads
CO-4	Apply the principles of Renewable energy resources for the construction of Power generating station.
CO-5	Categorize various energy conversion systems and their limitations.
Course-54	
Course Code:	A30253
Course Title:	ADVANCED CONTROL THEORY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the mathematical model of linear/non-linear systems in state space.
CO-2	Investigate the controllability/observability of a given system.
CO-3	Analyze stability of linear / Non-linear systems using various methods.
CO-4	Design state feedback controller and optimal controller for a given system.
CO-5	Evaluate the stability of the given system by Lyapunov criterion.
Course-55	
Course Code:	A30254
Course Title:	HYBRID ELECTRIC VEHICLES

Theory/Laboratory:	Theory
CO-1	Analyze the topologies used for design of hybrid electric vehicles.
CO-2	Apply the concepts of power electronics & drives to control hybrid electric vehicles.
CO-3	Analyze power flow control and various energy storage components used for hybrid electric vehicles.
CO-4	Demonstrate different configurations, techniques and sizing of components used in hybrid electric vehicles.
Course-56	
Course Code:	A30255
Course Title:	SMART GRID TECHNOLOGY
Theory/Laboratory:	Theory
CO-1	Demonstrate the need of converting conventional grid to Smart Grid.
CO-2	Assess the role of automation in Transmission and Distribution.
CO-3	Apply Evolutionary Algorithms for the Smart Grid.
CO-4	Analyse various Methods used for information security on smart grid
CO-5	Analyse Voltage and Frequency control techniques in Micro Grids.
Course-57	
Course Code:	A30256
Course Title:	DIGITAL CONTROL SYSTEMS
Theory/Laboratory:	Theory
CO-1	Apply the Sampling and reconstruction theory in A/ D &D/A Conversion.
CO-2	Solve the given differential equations using Z- transforms.
CO-3	Analyse the given discrete time system in frequency domain and Z domain.
CO-4	Design a given discrete time system in Z – Plane and state space representation.
CO-5	Investigate the Stability of the closed loop systems using Z- transforms.

R19 REGULATIONS	
Course-I	
Course Code:	A2230
Course Title:	POWER SYSTEM OPERATION AND CONTROL

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the mathematical models of turbines and governors
CO-2	Analyse the Address the Load Frequency Control problem
CO-3	Design shunt and series compensation helps in reactive power control
CO-4	Analyse the issues concerned with power system operation in competitive environment.
Course-2	
Course Code:	A2231
Course Title:	POWER SYSTEM PROTECTION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Realize the basic requirements of relays as primary and backup protection along with their constructional details.
CO-2	Analyze the static and microprocessor based relays along with their specifications advantages and disadvantages
CO-3	Interpret the various techniques involves in the generator and transformer protection against faults in the system
CO-4	Explain the techniques involves in the protection of feeders and transmission lines
CO-5	Understand the fundamental principles of circuit breakers along with their ratings and specifications
CO-6	Describe the causes for over-voltages in power system and also explain the various protective schemes for the protection from over-voltages
Course-3	
Course Code:	A2232
Course Title:	PLC and Its Applications
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	It is to provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
CO-2	Learn the process of collecting information/ data through PC from real world sources
CO-3	Learn remote and networked data acquisition and operating system
CO-4	Learn programmable logic controllers, and its application.
Course-4	
Course Code:	A1230
Course Title:	POWER SYSTEM LABORATORY
Theory/ Laboratory:	Laboratory

Course Outcomes	
CO-1	Determine the positive, negative and zero sequence impedances of cylindrical rotor synchronous machine
CO-2	Carry out the fault analysis for various types of faults involving LG, LL, LLG and LLLG Faults
CO-3	Evaluate characteristics of Over Voltage Relay and IDMT over Current Relay.
CO-4	Evaluate characteristics of Negative Sequence Relay, Percentage biased Differential Relay
Course-5	
Course Code:	A2251
Course Title:	SPECIAL ELECTRICAL MACHINES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyse the performance of switched reluctance motors, stepper motors, permanent magnet dc motors linear motors and servo motors
CO-2	Deduce the emf and torque equations of stepper motor, servo motor, reluctance motor and BLDC motor.
CO-3	Apply speed control techniques for switched reluctance motors, stepper motors, Permanent magnet dc motors linear motors and servo motors
CO-4	Plot the characteristics of switched reluctance motors, stepper motors,Permanent magnet dc motors linear motors and servo motors

Course-6	
Course Code:	A2252
Course Title:	RENEWABLE ENERGY RESOURCES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the principles of Renewable energy resources for the construction of Power generating station.
CO-2	Analyse various harvesting techniques and energy storage methods in renewable energy systems for different applications
CO-3	Analyse Renewable energy systems for various environmental conditions.
CO-4	Categorize various energy conversion systems and their limitations
Course-7	
Course Code:	A2253
Course Title:	ADVANCED CONTROL THEORY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the mathematical model of linear/non-linear systems in state space
CO-2	Investigate the controllability/observability of a given system

CO-3	Analyze stability of linear / Non-linear systems using various methods.
CO-4	Design state feedback controller and optimal controller for a given system.
CO-5	Evaluate the stability of the given system by Lyapunov criterion.
Course-8	
Course Code:	A2254
Course Title:	HYBRID ELECTRIC VEHICLES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the topologies used for design of hybrid electric vehicles
CO-2	Apply the concepts of power electronics & drives to control hybrid electric vehicles.
CO-3	Analyze power flow control and various energy storage components used for hybrid electric vehicles
CO-4	Demonstrate different configurations, techniques and sizing of components used in hybrid electric vehicles.
Course-9	
Course Code:	A2255
Course Title:	SMART GRIDTECHNOLOGY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-	Demonstrate the need of converting conventional grid to Smart Grid
CO-2	Assess the role of automation in Transmission and Distribution.
CO-3	Apply Evolutionary Algorithms for the Smart Grid.
CO-4	Analyse various Methods used for information security on smart grid
CO-5	Analyse Voltage and Frequency control techniques in Micro Grids.
Course-IO	
Course Code:	A2256
Course Title:	DIGITAL CONTROL SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply the Sampling and reconstruction theory in A/ D &D/A Conversion.
CO-2	Solve the given differential equations using Z- transforms.

CO-3	Analyse the given discrete time system in frequency domain and Z domain
C0-4	Design a given discrete time system in Z – Plane and state space representation
CO-5	Investigate the Stability of the closed loop systems using Z- transforms.
Course-11	
Course Code:	A2257
Course Title:	FACTS and its Applications
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	To understand the fundamentals of FACTS Controllers, Importance of controllable parameters and types of FACTS controllers and their benefits.
CO-2	To understand basic concepts of voltage and current source converters.
CO-3	Compare the static shunt and static series compensators
CO-4	Analyse the working principle of operation of Unified Power Flow Controller.

Course-12	
Course Code:	A2258
Course Title:	HIGH VOLTAGE ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyse the breakdown mechanisms of solids liquids and Gases.
CO-2	Design the insulation for power system components.
CO-3	Analyse and calculate the circuit parameters involved in generation of high voltages.
CO-4	Measure the alternating signals, impulse high voltage signals, dielectric loss and partial discharge

Program Educational Objectives (PEO's):v	
The programme Educational objectives (PEOs) of the under graduate programme in Electrical and Electronics Engineering at G. Pullaiah College of Engineering and Technology, Kurnool are to prepare the graduates to possess the ability to	
PEO 1:	Apply the principles of basic engineering sciences in performing professional tasks in Electrical and Electronics Engineering and to develop awareness on the issues of societal concerns.
PEO 2:	Analyze and design Electrical and Electronics Engineering projects considering environmental and socio-economic impacts.
PEO 3: Develop team spirit and leadership skills for successful completion and management of projects	
PEO 4:To pursue lifelong learning to meet societal and professional challenges.	

Program outcomes (PO's):
Engineering Graduate will be able to:

PO 1-Engineering Knowledge: Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering problems.
PO 2-Problem analysis: Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3-Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO 5-Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6-The engineer and society: Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7-Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
PO 8-Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9-Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10-Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give receive clear instructions.
PO 11-Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12-Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
Program Specific Outcomes (PSOs):
The Program Specific Outcomes (PSO's) of the under graduate programme in Electrical and Electronics Engineering at G. Pullaiah College of Engineering and Technology, Kurnool are to prepare the graduates to possess the ability to
PSO 1: Design a variety of Electrical and/or Electronic-based components and systems for applications including Power Electronics, Power Systems, Signal processing, Control systems and Electrical Machines.
PSO 1: Design a variety of Electrical and/or Electronic-based components and systems for applications including Power Electronics, Power Systems, Signal processing, Control systems and Electrical Machines.

DEPARTMENT OF MECHANICAL ENGINEERING	
COURSE OUTCOMES (R20- Regulation)	
Course-I	
Course Code:	A30002
Course Title:	MATHEMATICS – I
Theory/ Laboratory:	THEORY
Course Outcomes	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications
CO-2	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications
CO-3	Utilize mean value theorems to real life problems.
CO-4	Familiarize with functions of several variables which is useful in optimization.
CO-5	Apply important tools of calculus in higher dimensions and will become familiar with 2-dimensional coordinate systems
CO-6	Analyze 3- dimensional coordinate systems and utilization of special functions.
Course-2	
Course Code:	A30003
Course Title:	ENGINEERING PHYSICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply mechanicsfor solving engineering problems
CO-2	Apply the principles of acoustics for noise cancellation and in designing buildings
CO-3	Analyse the applications of ultrasonics in various engineering fields
CO-4	Explain the principles of physics in dielectrics and magnetic materials
CO-5	Interpret the concepts of lasers and optical fibers in various applications
CO-6	Elucidate the applications of superconductors and nano materials
Course-3	
Course Code:	A30501
Course Title:	PYTHON PROGRAMMING

Theory/ Laboratory:	

Course Outcomes	
CO-1	Comprehend the fundamental concepts of computer hardware and problem solving Abilities
CO-2	Knowledge on the basic concepts of algorithms, flow charts and python programming.
CO-3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
CO-4	Interpret the importance of functions in programming
CO-5	Analyze and modularize the problem and its solution by using functions.
CO-6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications.
Course-4	
Course Code:	A30001
Course Title:	COMMUNICATIVE ENGLISH
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Remember the concepts which the student has learnt previously and identifying theirconnection
CO-2	Understand the context, topic, and pieces of specific information from social ortransactional dialogues spoken by native speakers of English
CO-3	Apply grammatical structures to formulate sentences and correct word forms
CO-4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO-5	Evaluate reading/listening texts and to write summaries based on global Comprehension of these texts.
CO-6	Create a coherent paragraph interpreting a figure/graph/chart/table
Course-5	
Course Code:	A30301
Course Title:	ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING
Theory/ Laboratory:	THEORY
Course Outcomes	
CO-1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing
CO-2	Apply orthographic projection concepts to draw projections of points, lines, planesand solids.
CO-3	Apply development concepts to draw development of surfaces of simple solids.

CO-4	Apply isometric projection concepts to draw isometric projections of right regularsolids
CO-5	Apply orthographic projection concepts to convert isometric view to orthographic views
CO-6	Make use of AutoCAD Software to draw 2D diagrams of various objects

Course-6	
Course Code:	A30006
Course Title:	COMMUNICATIVE ENGLISH LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO-2	Apply communication skills through various language learning activities
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO-4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO-5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO-6	Improve upon speaking skills over telephone, role plays and public speaking
Course-7	
Course Code:	A30007
Course Title:	ENGINEERING PHYSICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Estimate the mechanical properties of materials
CO-2	Determine moment of inertia of a flywheel
CO-3	Measure the velocity of ultrasonics in liquid by applying the basic concepts of ultrasonics
CO-4	Determine the wavelength of laser, particle size, numerical aperture and acceptanceangle by applying the principles of lasers and optical fibres
CO-5	Measure the elastic constants, Poisson's ratio of the material
CO-6	Measure the strain of the metal bar by using strain gauge.
Course-8	
Course Code:	A30502
Course Title:	PYTHON PROGRAMMING LABORATORY
Theory/ Laboratory:	Laboratory

Course Outcomes	
CO-1	a) Running instructions in Interactive interpreter and a Python Script. b) Write a program to compute distance between two points taking input from theuser
CO-2	a) Write a Program for checking whether the given number is a even number or not. b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3,1/4, . . ,1/1
CO-3	a) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero. b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.
CO-4	a) Write a Python program to check if a number is a perfect number. b) Write a Python program to check if a number is a strong number.
CO-5	a) Write a program to count the number of characters in the string and store them in a
CO-6	Select appropriate programming construct for solving the problem
Course-9	
Course Code:	A30010
Course Title:	MATHEMATICS – II
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the mathematical principles to solve second and higher order differential equations.
CO-2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO-3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO-4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs
CO-5	Analyze the vector calculus involving divergence, curl and their properties alongwithvector identities.
CO-6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.
Course-IO	
Course Code:	A30012
Course Title:	ENGINEERING CHEMISTRY
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.
CO-2	To differentiate between pH metry, Potentiometric and conductometric titrations. .
CO-3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO-4	Understand the principles of different analytical instruments and explain their applications.
CO-5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO-6	Explain of different types of colloids, their preparations, properties and applications
Course-11	
Course Code:	A30505
Course Title:	C AND DATA STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply fundamental programming concepts of C for solving general purpose problems.
CO-2	Implement functions for organized software development.
CO-3	Apply various operations on linear data structures.
CO-4	Design techniques for efficient searching and sorting of a given application.
CO-5	Develop programs on stacks and Queues for real time applications
CO-6	Analyze Linear and nonlinear programming for efficiency
Course-12	
Course Code:	A30303
Course Title:	ENGINEERING MECHANICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the basic concepts of rigid bodies subjected to different types of loads and supports.
CO-2	Analyze the motion of the bodies considering friction and external loads.
CO-3	Determine centroids, centre of gravity, moment of inertia of simple and compositefigures.
CO-4	Analyze the motion of particle without considering forces and considering forces, develop equations for different motions.
CO-5	Apply Newton’s laws and conservation laws to elastic collisions and motion of rigidbodies.

CO-6	Analyze the perfect frames using different methods and concepts of Mechanicalvibrations.
Course-13	
Course Code:	A30302
Course Title:	ENGINEERING WORKSHOP
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply wood working skills to make products.
CO-2	Perform metal cutting operations in the fitting section to make models
CO-3	Perform simple welding operations to join to metal pieces.
CO-4	Apply sheet metal working skills to make required models.
CO-5	Evaluate the performance analysis of various pumps and turbines.
CO-6	Perform general maintenance works on own at house/ work place.
Course-14	
Course Code:	A30013
Course Title:	ENGINEERING CHEMISTRY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Determine the cell constant and conductance of solutions
CO-2	Prepare advanced polymer materials
CO-3	Determine the physical propertieslike surface tension, adsorption andviscosity
CO-4	Estimate the Iron and Calcium in cement
CO-5	Calculate the hardness of water and calculation of dissolved oxygen percentages
CO-6	Determination of percentage of Iron in Cement sample by colorimetry
Course-15	
Course Code:	A30506
Course Title:	C AND DATA STRUCTURES LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Develop fundamental programs in C for solving general purpose problems.
CO-2	Implement functions for reusability and easy maintenance
CO-3	Apply various operations on linear data structures.

CO-4	Design techniques for efficient searching and sorting of a given application
CO-5	Develop programs on stacks and Queues for real time applications.
CO-6	Apply Linear and nonlinear programming for efficiency.
Course-16	
Course Code:	A30304
Course Title:	APPLIED MECHANICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Acquire knowledge of static and dynamic behavior of the bodies.
CO-2	Verify the Principle of moments using the bell crank lever apparatus
CO-3	Determine velocity ratio, mechanical advantage and efficiency of single and double gear crab
CO-4	Determine the velocity ratio of the machine and to interpret the law of machine
CO-5	Analyze the coefficient of static friction between two surfaces
CO-6	Apply laws of mechanics to determine efficiency of simple machines with consideration of friction
Course-17	
Course Code:	A30032
Course Title:	UNIVERSAL HUMAN VALUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
CO-2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO-3	Understand the value of harmonious relationship based on trust and respect in their life and profession
CO-4	Understand the role of a human being in ensuring harmony in society and nature.
CO-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
CO-6	Analyze the value of maintaining ethical values in critical situations
COURSE OUTCOMES (R19- Regulation)	
Course-IS	
Course Code:	A30014

Course Title:	TRANSFORM TECHNIQUESAND NUMERICAL METHODS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply Laplace transforms to solve ordinary differential equations.
CO-2	Build Fourier series and Fourier transforms of a given function.
CO-3	Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
CO-4	Understand and apply the concepts of curve fitting, numerical differentiation and integration
CO-5	Interpret the numerical solutions of ordinary differential equations employing Taylor series, Euler's, Picard's and Runga-kutta methods.
Course-19	
Course Code:	A30305
Course Title:	THERMODYNAMICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the concepts of thermodynamics in the form of Work and Heat to various engines
CO-2	Make use of energy equations for steady flow of fluids.
CO-3	Apply the thermodynamic laws to various applications.
CO-4	Determine the efficiency of the cycles for various applications.
CO-5	Analyze basic laws of ideal gas, power cycles and refrigeration cycles for various applications.
Course-20	
Course Code:	A30306
Course Title:	MECHANICS OF SOLIDS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the types of stresses, strains and elastic constants of mechanical components
CO-2	Construct shear force and bending moment diagrams for beams subjected to various loads.
CO-3	Formulate the bending and shear stress equations and shear stress distribution for beams and shafts
CO-4	Solve problems related to slope and deflection equations for beams subjected to various loads
CO-5	Estimate hoop and longitudinal stresses in thin and thick cylinders
Course-21	

Course Code:	A30307
Course Title:	MATERIAL SCIENCE AND ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify the properties of the crystallization of ferrous and nonferrous materials.
CO-2	Construct the equilibrium diagrams by experimental methods.
CO-3	Make use of advanced composite materials in manufacturing of components and sophisticated machine.
CO-4	Improve the properties of ferrous and nonferrous materials using different heat treatment processes.
CO-5	Select the suitable materials for various engineering applications.
Course-22	
Course Code:	A30019
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO-2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
CO-3	Classify the market structure to decide the fixation of suitable price
CO-4	Apply capital budgeting techniques to select best investment opportunity.
CO-5	Analyze and prepare financial statements to assess financial health of business.
Course-23	
Course Code:	A30308
Course Title:	MECHANICS OF SOLIDS LABORATORY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	1 Analyze the stress-strain diagram for different materials using universal testing machine
CO-2	Compare the hardness values for various materials using hardness testing machine
CO-3	. Determine modulus of elasticity, bending stresses and deflection for different beams
CO-4	Estimate the stiffness and shear modulus of springs using tension test

CO-5	Asses the toughness and impact strength using impact testing machine.
Course-24	
Course Code:	A30309
Course Title:	MATERIAL SCIENCE AND ENGINEERING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Make use of different material samples for investigating micro structures.
CO-2	Interpret the microstructures of materials usingmetallurgical microscope
CO-3	Measure the hardenability of mild steel samples.
CO-4	Improve the properties of materials using various heat treatment processes.
CO-5	Compare the properties of different materials with temperature variation.
Course-25	
Course Code:	A30310
Course Title:	COMPUTER AIDED DRAFTING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify the commands in AutoCAD software to draw required objects
CO-2	Create the mechanical components in 2 – Dimensional using AutoCAD commands
CO-3	Draw the projections of solids using AutoCAD commands
CO-4	Draw the sectional views of solids using AutoCAD commands
CO-5	Draw the orthographic views of solids from isometric views using AutoCAD commands
Course-26	
Course Code:	A30311
Course Title:	SOLID WORKS
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Construct complex geometries of machine components in sketcher mode.
CO-2	Demonstrate competency with multiple drawing and modification commands in Solid Works.
CO-3	Plan 2D and 3D drawings based on design constraints
CO-4	Create three-dimensional assemblies incorporating multiple solid models.
CO-5	Apply industry standards in the preparation of technical mechanical drawings..

Course-27	
Course Code:	A30031
Course Title:	ENVIRONMENTALSCIENCE
Theory/ Laboratory:	Theroy
Course Outcomes	
CO-1	Solve environmental problems through higher level of personal involvement and interest.
CO-2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO-3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
C0-4	Apply environmental laws for the protection of environment and wildlife.
C0-5	Influence society in proper utilization of goods and services
Course-28	
Course Code:	A30011
Course Title:	PROBABILITY AND STATISTICS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Adopt correlation methods and principle of least squares, regression analysis.
C0-2	Apply discrete and continuous probability distributions.
C0-3	Interpret the association of characteristics and through correlation and regression tools.
C0-4	Design the components of a classical hypothesis test.
C0-5	Infer the statistical inferential methods based on small and large sampling tests.
Course-29	
Course Code:	A30312
Course Title:	MANUFACTURING TECHNOLOGY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Select suitable material for preparing the patterns
C0-2	Make use of moulding systems to prepare a product
C0-3	Recommend the melting and solidification processes for designing the gating system.
C0-4	Identify the suitable special casting and welding processes used for the given application
C0-5	Identify the process parameters and defects to get quality product

Course-30	
Course Code:	A30313
Course Title:	KINEMATICS OF MACHINERY
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Differentiate mechanism, machine and structure with respect to kinematic motions.
C0-2	Analyse the mechanism of straight-line motion, steering and Hooke's joint as per suitable applications.
CO-3	Draw velocity and acceleration diagrams by using relative velocity method and instantaneous center method.
CO-4	Solve the problems related to gears and gear trains using suitable methods.
CO-5	Analyze cam profile design with specified contours

Course-31	
Course Code:	A30314
Course Title:	I.C. ENGINES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify constructional features and working principles of the S.I and C.I engines.
CO-2	Analyze the stages of combustion in S.I and C.I engines for better performance.
CO-3	Apply various performance methods to increase the engine efficiency.
CO-4	Identify constructional features and working principles of air compressors.
CO-5	select suitable automobile systems for internal combustion engine.
Course-32	
Course Code:	A30315
Course Title:	FLUID MECHANICS & HYDRAULIC MACHINES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze properties of fluids under different conditions
CO-2	Identify the fluid flow patterns using different equations
CO-3	Determine fluid flow using devices and principles of fluid mechanics
CO-4	Apply boundary layer concepts to various types of flow and forces exerted by jet on vanes

CO-5	Estimate the performance of hydraulic turbines and pumps for various design considerations
Course-33	
Course Code:	A30316
Course Title:	ENGINEERING DRAWING FOR MECHANICAL ENGINEERS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply orthographic projection concepts to draw projections of right regular solids.
C0-2	Make use of sectional planes to draw sectional views of a solid.
C0-3	Apply isometric projection concepts to draw isometric projections of right regular Solids and sectioned solids.
C0-4	Construct Intersection curves when one right regular solid penetrates another right regular solid.
C0-5	Make use of perspective projection concepts to draw simple planes and right regular solids.
Course-34	
Course Code:	A30317
Course Title:	MANUFACTURING TECHNOLOGY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Identify various casting and welding equipments used in manufacturing processes
C0-2	Choose suitable Sand properties of green sand to get quality specimen
C0-3	Determine the sequence of process to complete a job
C0-4	Make use of various welding, foundry and forming equipments to prepare the job
C0-5	Apply pattern making procedure for casting process
Course-35	
Course Code:	A30318
Course Title:	FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Analyze procedure for performance of various experiments.
C0-2	Calibrate flow discharge measuring devices used in pipes, channels and tanks.
C0-3	Analyze the fluid flow through pipes with different materials and sizes.
C0-4	Determine coefficient of discharge of fluid flow through pipes

C0-5	Evaluate the performance analysis of various pumps and turbines.
Course-36	
Course Code:	A30319
Course Title:	I.C ENGINES LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Construct valve and port timing diagram of SI engine and CI engine.
C0-2	Analyze the influence of variations in TDC and BDC operations of I.C engine
C0-3	Calculate the power and efficiencies of I.C engines
C0-4	Test the performance of IC engine at various loads and Air fuel ratio
C0-5	Calculate the efficiency of reciprocating air compressor
Course-37	
Course Code:	A30320
Course Title:	COMPUTER AIDED DRAFTING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	understand and interpret drawings of machine components so as to prepare assembly drawings either manually and using standard CAD packages.
C0-2	Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program
C0-3	Create 2D and 3D models of Engineering Components and gain practical experience in handling 2D drafting and 3D modelling software systems.
C0-4	Apply the basic principles associated with CADD and to demonstrate common drafting techniques and shortcuts used by professionals..
C0-5	Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.
R20 REGULATIONS	
Course-38	
Course Code:	A30322
Course Title:	THERMAL ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply power cycles and efficiency enhancement methods to generate power
C0-2	Calculate the chimney height and draught for maximum discharge
C0-3	Determine the characteristics of flow through nozzle

C0-4	Construct the various velocity triangles of steam turbines
C0-5	Analyze the working principle and performance of various thermal equipment
Course-39	
Course Code:	A30323
Course Title:	DYNAMICS OF MACHINERY
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply gyro-principles to stabilize the motion of vehicle
CO-2	Analyse the forces of the Flywheel in IC Engine
CO-3	Estimate the range of speeds of various governors suitable for applications
CO-4	Solve problems on balancing of rotating masses and reciprocating masses in Vengine and multi cylinder engines
CO-5	Evaluate the critical speed of the shaft and simple vibration calculations of rotor systems
Course-40	
Course Code:	A30324
Course Title:	Design of Machine Elements
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the design process and theories of failure for designing different machine elements.
CO-2	Solve the problems related to simple and complex components under different loads using Goodman's and Soderberg's criteria.
CO-3	Estimate the stress induced in riveted and bolted joints under different load conditions
CO-4	Analyze the failures in shafts, cotter joint and knuckle joint subjected to various loads.
CO-5	Design the keys, rigid and flexible couplings as per the standards suitable to applications
Course-41	
Course Code:	A30325
Course Title:	MACHINE TOOLS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify various machine tools used in machine shop

CO-2	Distinguish the constructional features and operations of general purpose machines.
CO-3	Determine the sequence of operations to process a job
CO-4	Make use of various machining operations to perform metal cutting
CO-5	Prepare models using required machine tools
Course-42	
Course Code:	A30326
Course Title:	CAD / CAM LABORATORY
Theory/ Laboratory:	LABORATORY
Course Outcomes	
CO-1	Construct complex geometries of machine components in sketcher mode.
CO-2	Create programs to generate analytical and synthetic curves used in engineering practice.
CO-3	Plan 2D and 3D drawings based on design constraints
CO-4	Applying CAD/CAM concept to product design and manufacturing.
CO-5	Analyze G and M codes for turning and milling components.
Course-43	
Course Code:	A30327
Course Title:	MACHINE DRAWING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Construct the conventional representation of different materials used in engineering practice.
CO-2	Identify the machine elements and designation of material.
CO-3	Apply the drawing techniques to draw various parts of assembly drawing, tolerances, roughness.
CO-4	Improve visualization ability of surface roughness and its indications with respect to the material surface
CO-5	Plan the production drawings based on design constraints.
Course-44	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	Develop a better understanding of important issues related to gender in contemporary India
CO-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
CO-3	Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4	Equip to work and live together as equals
CO-5	Develop a sense of appreciation of women in all walks of life
Course-45	
Course Code:	A30328
Course Title:	NON-CONVENTIONAL SOURCES OF ENERGY
Laboratory/ Theory	Theory
Course Outcomes	
CO-1	Identify various conventional and non-conventional sources of energy.
CO-2	Estimate the energy collection using suitable equipment.
CO-3	Compare different energy conversion systems within the available resources for better utilization.
CO-4	Make use of the suitable energy storage methods for real-time requirements.
CO-5	Analyze the advanced power generation systems like Magneto Hydro Dynamics and other methods for future requirements.
Course-46	
Course Code:	A30329
Course Title:	DESIGN OF TRANSMISSION SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Assess the type of stresses induced in crane hooks, C-clamps and drives subjected to various loadings.
CO-2	Design different types of bearings for suitable applications.
CO-3	Design springs and power screws under different load conditions as per the practical situation.
CO-4	Solve the problems related to spur and helical gears for power transmission.
CO-5	Analyze the stresses induced in IC engine parts subjected to various loads.
Course-47	
Course Code:	A30330
Course Title:	HEAT TRANSFER
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	Apply laws of heat transfer in thermal analyses of engineering systems.
CO-2	Calculate the amount of heat transfer in conduction, convection and radiation modes.
CO-3	Discuss the concept of conduction heat transfer and its applications.
CO-4	Analyze the free and forced convective heat transfer for fluids.
CO-5	Analyze the concept of radiative heat transfer between black bodies and grey bodies.
Course-48	
Course Code:	A30331
Course Title:	HEAT TRANSFER LABORATORY
Theory I Laboratory:	Laboratory
Course Outcomes	
CO-1	Analyze thermal conductivity in various materials.
C0-2	Calculate heat transfer coefficient in various materials.
C0-3	Select appropriate materials for improving effectiveness of heat transfer.
C0-4	Test the performance and there by improve effectiveness of heat exchanger.
C0-5	Calculate emissivity and Stefan's Boltzmann constant for various bodies through radiation.
Course-49	
Course Code:	A30238
Course Title:	Computational Laboratory
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Understand the use of software tools for modelling and analysis of mathematical concepts for engineering applications
C0-2	calculate the inverse of any matrix using MATLAB
C0-3	Model and analyze Monte-Carlo simulation for suitable applications
C0-4	Assess the Standard Normal Distributionand its importance in engineering applications
C0-5	Model and analyze simple engineering concepts and its importance in engineering applications
Course-SO	
Course Code:	A30021
Course Title:	Professional English Communication Skills laboratory
Theory/ Laboratory:	Laboratory
Course Outcomes	

C0-1	Use techniques at different levels to convince the employers.
C0-2	Use technology to convince the audience with skills.
C0-3	Realize where exactly he has to improve.
C0-4	Identify and develop effective technical writing skills.
C0-5	Communicate effectively using the ICT tools.
C0-6	Learn and be competent in heterogeneous groups.
Course-51	
Course Code:	A30321
Course Title:	ANSYS SKILL
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply mathematical skills in the design and analysis of model generations and analysis.
CO-2	Exercise analytical skills in model verifications and interpretations of FEA results.
CO-3	Apply knowledge from component design in projects
CO-4	Detailing a conceptual design involves determining material specifications, Dimensions, tolerances, performance measures, etc
CO-5	Understand the basic concepts of modelling for analysis and manufacturability.
Course-52	
Course Code:	A30036
Course Title:	INDIAN CONSTITUTION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Explain the role of President and Prime Minister.
CO-3	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-4	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO-5	Analyze the decentralization of power between central, state and local self-government.
CO-6	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

R19 REGULATIONS	
Course-I	
Course Code:	**A2334**
Course Title:	**OPERATIONS RESEARCH**
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply various Operations Research models and methods to solve real world problems.
CO-2	Solve Linear Programming, assignment, sequencing, game theory,queuing, transportation and project management problems for optimum solution.
CO-3	Evaluate various alternatives available to find optimal solution for real world problems.
CO-4	Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.
CO-5	Decide the best operating policy for the efficient use of resources.
Course-53	
Course Code:	**A2335**
Course Title:	Metrology and Measurements
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	to understand the Limits, Fits and Tolerance. Indian standard system – International Standard organization system.
CO-2	Explain the principles of working of the most commonly used instruments for measuring linear and angular distances.
CO-3	study the different types of Comparators, optical measuring instruments, flatness measurement methods and measuring methods of surface roughness
CO-4	understand, Screw thread elements and measuring methods, Gear tooth profile measurement.
CO-5	understand working of various All instruments used for measuring for displacement, temperature and pressure.
CO-6	understand working of various instruments used for measuring for flow, speed, stress, strain and Vibration.
Course-54	
Course Code:	**A2337**
Course Title:	METROLOGY & MEASUREMENTS LABORATORY

Theory/ Laboratory:	Theory
Course Outcomes	
CO-l	Apply mathematical skills in the linear measurements
CO-2	Understand the optical measuring methods.
CO-3	Apply knowledge of comparators in industrial projects
CO-4	Detailing a conceptual design involves determining material specifications,Dimensions, tolerances, performance measures, etc
CO-5	Understand the basic concepts of screw threads and gear measuring methods
Course-55	
Course Code:	A1341
Course Title:	ADDITIVE MANUFACTURING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	History and Development of Additive manufacturing, Applications, and RP data formats.
CO-2	Basic Concept Reverse Engineering and Software's for Additive Manufacturing.
CO-3	Principle, Process, Materials, Advantages of Solid and Liquid Based AM Systems.
CO-4	Principle and Process of Selective Laser Sintering of Powder Based AM Systems
CO-5	Principle, Process, Advantages, Limitations, Applications of BPM, SDM, AM systems
Course-56	
Course Code:	A1339
Course Title:	INSTRUMENTATION AND CONTROL SYSTEMS LAB
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Understand basic principles of instrumentation and control systems
CO-2	Apply calibration of measuring instruments for linear and angular

	displacement.
CO-3	Understand calibration of measuring instruments for temperature.
CO-4	Apply calibration of measuring instruments of flow and speed measurement
CO-5	Demonstrate working principle of level measuring devices for ascertaining liquid level and choose appropriate device for controlling fluid level in industrial applications.
CO-5	Make use of appropriate instrument for measuring Speed, Acceleration and Vibration by considering different aspects.
Course-59	
Course Code:	**A2336**
Course Title:	COMPUTER AIDED ENGINEERING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply mathematical skills in the design and analysis of model generations and analysis.
CO-2	Exercise analytical skills in model verifications and interpretations of FEA results.
CO-3	Apply knowledge from component design in projects
CO-4	Detailing a conceptual design involves determining material specifications, Dimensions, tolerances, performance measures, etc
CO-5	Understand the basic concepts of modelling for analysis and manufacturability.
Course-60	
Course Code:	A1351
Course Title:	MACHINING PROCESSES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify the various machining processes and machine tools
CO-2	Classify various metal cutting machines such as lathe, milling, drilling, boring, grinding, shaping, Slotting and planer machines.
CO-3	Choose the suitable tools for machining processes.
CO-4	Apply calibration of measuring instruments of flow and speed measurement
CO-5	Categorize the components of the machines.
Course-61	
Course Code:	A1352
Course Title:	NON-CONVENTIONAL SOURCES OF ENERGY

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify various conventional and non-conventional sources of energy.
CO-2	Estimate the energy collection using suitable equipment.
CO-3	Compare different energy conversion systems within the available resources for better utilization.
CO-4	Make use of the suitable energy storage methods for real-time requirements.
CO-5	Analyze the advanced power generation systems like Magneto Hydro Dynamics and other methods for future requirements.
Course-62	
Course Code:	A1353
Course Title:	ENGINEERING MATERIALS FOR DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Distinguish the brittle and ductile fracture of materials and its crack structures
CO-2	Analyse the structural components taking into account presence of flaws, nature of loading and constitutive behaviour of the material.
CO-3	Apply J-Integral for crack initiation and tip opening displacement in materials
CO-4	Assess the dynamic stress intensity and elastic energy release rate induced in materials
CO-5	Identify the various stages of crack propagation, load spectrum, crack growth initiation
Course-63	
Course Code:	A1354
Course Title:	PRINCIPLES OF MANAGEMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Build organization structure and managerial skills to obtain the leadership qualities.
CO-2	Select suitable plant layout as per the requirements of production process.
CO-3	Apply work improvement techniques in an organization for increasing the productivity
CO-4	Choose suitable type of Plant maintenance for industrial safety.

CO-5	Appraise social responsibilities of engineer and ways to protect our environment
Course-64	
Course Code:	A1355
Course Title:	FLEXIBLE MANUFACTURING SYSTEM
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify FMS layouts and its significance in manufacturing process
CO-2	Apply various material handling and storage systems as per applications
CO-3	Differentiate cellular vs Flexible Manufacturing system for scheduling problems
CO-4	Solve the problems on performance of computer controlling the flexible manufacturing systems
CO-5	Plan FMS data base as per simulation of scheduling problems
Course-65	
Course Code:	A1356
Course Title:	REFRIGERATION AND AIR CONDITIONING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Make use of the terminologies and the basic principles associated with refrigeration and air conditioning systems.
CO-2	Distinguish between the components of refrigeration and air conditioning systems
CO-3	Estimate the efficiency of refrigeration and air-conditioning systems under various load conditions.
CO-4	Discuss the constructional features of domestic, industrial refrigeration and air conditioning systems.
CO-5	Select suitable refrigeration and air-conditioning systems for domestic as well as industrial applications.
Course-66	
Course Code:	A1357
Course Title:	MECHANICAL VIBRATIONS
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	Identify the need and importance of vibration analysis in vibratory conditions
CO-2	Develop the equations of motion for free and forced vibrations with damped and undamped conditions
CO-3	Analyze frequency and time response of vibratory systems
CO-4	Solve the problems related to single and multi-degree of vibratory systems with damped and undamped conditions.
CO-5	Differentiate discrete and continuous systems pertain to numerical methods.
Course-67	
Course Code:	A1358
Course Title:	ENERGY MANAGEMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply methods of capital budgeting, depreciation and cost analysis for energy conservation.
CO-2	Analyze the viability of energy conservation projects using suitable management technique.
CO-3	Develop energy audit report through energy management skills and strategies
CO-4	Apply the energy management process in various industries.
CO-5	Assess the trade and policy environment for effective energy management
Course-68	
Course Code:	A1359
Course Title:	PROJECT MANAGEMENT
Theory/ Laboratory:	Thryeo
Course Outcomes	
CO-1	Apply project management practices to the launch of new programs, products, services and events.
CO-2	Apply the risk management plan to find the risk to stakeholders.
CO-3	Evaluate project characteristics at various stages of a project.
CO-4	Make use of project management tools and techniques for successful completion of the project
CO-5	Appraise the role of project manager in organizational change.
Course-69	

Course Code:	A1360
Course Title:	AUTOMOBILE ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify components of various automobile systems including turbo chargers and super chargers
CO-2	Examine the environmental implications of automobile emissions
CO-3	Analyze brakes, steering and suspension systems of engine for better performance.
CO-4	Analyze the effect of electrical and transmission system on the performance of an automobile engine.
CO-5	Discuss the purpose and methods of various automobile systems and their applications.
Course-70	
Course Code:	A1361
Course Title:	TRIBOLOGY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Make use of the fundamentals of tribology and associated parameters in designing Bearings
CO-2	Apply friction and wear theories and measurement method on engineering applications
CO-3	Analyze the requirements of hydrodynamic journal and plane slider bearings for a given application.
CO-4	Solve problems pertaining to load carrying capacity and coefficient of friction
CO-5	Identify the commonly used bearing materials and their properties.
Course-71	
Course Code:	A1362
Course Title:	PRECISION ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply accuracy and tolerances for parts, assemblies according to ISO standards
CO-2	Categorize tolerances using principle of dimensional chains for individual features of a part or assembly

CO-3	Apply selective assembly concept for quality and economic production.
CO-4	Evaluate part and machine tool accuracies using different precision methods.
CO-5	Analyze the causes for dimensional and geometrical errors prior to and during machining

Program Educational Objectives
PEO 1: Apply Mechanical Engineering concepts by analyzing and solving the real time problems arising in mechanical systems of industry.
PEO 2: Develop leadership and communication skills and participate in continuous learning activities to advance their careers and life goals.
PEO 3: To enable to become a responsible citizen who undertakes the activities related to society for academic development nationally and internationally.
PEO 4: Adapt to rapidly changing industry needs by acquiring require technical knowledge that promotes innovation
Program Outcomes (PO'S) :
Engineering graduates will be able to **PO 1:** Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems
PO 2: Problem analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
PO 3: Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO 5: Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development
PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO 9: Individual and team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings
PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO 11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
Programme Specific Outcomes:
PSO1: Design and manufacturing of equipment related to so city in industry using software tools like AUTO CAD, Solid works, ANSYS, etc.
PSO2: To equip to Work in power plants and manufacturing industry in the sphere of operation and maintenance and to encourage students to pursue higher education and research in various disciplines both at national & international level.
PSO3: To analyse and apply the Mechanical Engineering advanced concepts like rapid prototyping, by joining hands with their peers to give comprehensive solutions to problems associated with real life situation

DEPARTMENT OF ECE	
COURSE OUTCOMES (R20 Regulation)	
Course-I	
Course Code:	A30002
Course Title:	MATHEMATICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
CO-2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO-3	Utilize mean value theorems to real life problems.
CO-4	Familiarize with functions of several variables which is useful in optimization
CO-5	Apply important tools of calculus in higher dimensions and will become familiar with 2- dimensional coordinate systems.
CO-6	Analyze 3- dimensional coordinate systems and utilization of special functions.
Course-2	
Course Code:	A30005
Course Title:	CHEMISTRY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box..
CO-2	To differentiate between pH metry, Potentiometric and conductometric titrations
CO-3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
CO-4	Understand the principles of different analytical instruments and explain their applications..
CO-5	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers..
CO-6	Explain of different types of colloids, their preparations, properties and applications
Course-3	
Course Code:	A30501
Course Title:	PYTHON PROGRAMMING

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Comprehend the fundamental concepts of computer hardware and problem solving Abilities
CO-2	Knowledge on the basic concepts of algorithms, flow charts and python programming.
CO-3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
CO-4	Interpret the importance of functions in programming
CO-5	Analyze and modularize the problem and its solution by using functions
CO-6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications.
Course-4	
Course Code:	A30401
Course Title:	FUNDAMENTALS OF ELECTRONICS ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze brief history of electronic components and devices.
CO-2	Analyze the function of CRO used to measure frequency, amplitude and phase.
CO-3	Comprehend the operation and characteristics of various electronic devices.
CO-4	Analyze various applications of semiconductor diodes.
CO-5	Make use of boolean algebra postulates to minimize boolean functions.
CO-6	Understand the basic principles of electronic communication.
Course-5	
Course Code:	A30302
Course Title:	ENGINEERING WORKSHOP
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply wood working skills to make products
CO-2	Perform metal cutting operations in the fitting section to make models.
CO-3	Perform simple welding operations to join to metal pieces
CO-4	Apply sheet metal working skills to make required models
CO-5	Evaluate the performance analysis of various pumps and turbines
CO-6	Perform general maintenance works on own at house/ work place.

Course-6	
Course Code:	A30502
Course Title:	PYTHON PROGRAMMING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design solutions to mathematical problems & Organize the data for solving the Problem..
CO-2	Understand and implement modular approach using python
CO-3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc.
CO-4	Understands about files and its applications.
CO-5	Develop real-world applications, files and exception handling provided by pytho
CO-6	Select appropriate programming construct for solving the problem
Course-7	
Course Code:	A30009
Course Title:	CHEMISTRY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Understand the determine the cell constant and conductance of solutions
CO-2	Prepare advanced polymer materials
CO-3	Measure the strength of an acid present in secondary batteries
CO-4	Understand and apply the pH metric titrations.
CO-5	Verify Lambert-Beer’slaw
CO-6	Potentiometry - determination of redox potentials and EMFs
Course-8	
Course Code:	A30402
Course Title:	FUNDAMENTALS OF ELECTRONICS ENGINEERING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Analyze brief history of electronic components and devices
CO-2	Analyze the function of CRO used to measure frequency, amplitude and phase
CO-3	Identify various electronic components and measuring equipment
CO-4	Assemble and test simple electronic circuits over a PCB.
CO-5	Interpret specifications (ratings) of the components.

CO-6	Understand the working of various communication systems.
Course-9	
Course Code:	A30010
Course Title:	MATHEMATICS – II
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the mathematical principles to solve second and higher order differential equations.
CO-2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO-3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems
CO-4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs
CO-5	Analyze the vector calculus involving divergence, curl and their properties along with vector identitie
CO-6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.
Course-IO	
Course Code:	A30004
Course Title:	APPLIED PHYSICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret the properties of light waves and its interaction of energy with the matter
CO-2	Explain the principles of physics in dielectrics and magnetic materials
CO-3	Apply electromagnetic wave propagation in different guided media
CO-4	Calculate conductivity of semiconductors
CO-5	Interpret the difference between normal conductor and super conductor
CO-6	Elucidate the applications of nano materials
Course-11	
Course Code:	A30503
Course Title:	DATA STRUCTURES USING C
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Learn to choose appropriate data structure as applied to specified problem definition
CO-2	Design and analyse linear and non-linear data structures.
CO-3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs
CO-4	Demonstrate advantages and disadvantages of specific algorithms and data

	Structures
CO-5	Develop programs for efficient data organisation with reduce time complexity.
CO-6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
Course-12	
Course Code:	A30001
Course Title:	COMMUNICATIVE ENGLISH
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Remember the concepts which the student has learnt previously and identifying their connection
CO-2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO-3	Apply grammatical structures to formulate sentences and correct word form
CO-4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO-5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO-6	Create a coherent paragraph interpreting a figure/graph/chart/table
Course-13	
Course Code:	A30301
Course Title:	ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO-2	Apply orthographic projection concepts to draw projections of points, lines, planes and solid
CO-3	Apply development concepts to draw development of surfaces of simple solids
CO-4	Apply isometric projection concepts to draw isometric projections of right regular solids
CO-5	Apply orthographic projection concepts to convert isometric view to orthographic views.
CO-6	Make use of AutoCAD Software to draw 2D diagrams of various objects
Course-14	
Course Code:	A30008
Course Title:	APPLIED PHYSICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	

CO-1	Operate optical instruments like Travelling microscope and spectrometer
CO-2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO-3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO-4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO-5	Evaluate the acceptance angle of an optical fiber and numerical aperture
CO-6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor
Course-15	
Course Code:	A30504
Course Title:	DATA STRUCTURES LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Learn to choose appropriate data structure as applied to specified problem definition.
CO-2	Design and analyse linear and non-linear data structure
CO-3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs
CO-4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
CO-5	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
CO-6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
Course-16	
Course Code:	A30006
Course Title:	COMMUNICATIVE ENGLISH LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO-2	Apply communication skills through various language learning activities
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO-4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO-5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO-6	Improve upon speaking skills over telephone, role plays and public speaking

Course-17	
Course Code:	A30031
Course Title:	ENVIRONMENTAL SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Solve environmental problems through higher level of personal involvement and interest.
CO-2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO-3	Recognize the interconnectedness of human dependence on the earth's ecosystems
CO-4	Solve environmental problems through higher level of personal involvement and interest.
CO-5	Influence society in proper utilization of goods and services.
Course-I8	
Course Code:	A30015
Course Title:	TRANSFORM TECHNIQUES AND COMPLEX VARIABLES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply Laplace transforms to solve ordinary differential equations.
CO-2	Build Fourier series and Fourier transforms of a given function.
CO-3	Test for analyticity of complex functions in the given domain
CO-4	Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper Integrals along contours
CO-5	Evaluate improper integrals of complex functions using Residue theorem
Course-19	
Course Code:	A30403
Course Title:	ELECTRONIC DEVICES AND CIRCUITS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Explain the construction, working principles and applications of various electronic devices.
CO-2	Analyze the characteristics of diodes and transistors.
CO-3	Design the DC bias circuitry of BJT and FET for various applications.
CO-4	Construct the simple amplifier circuits using BJT and FET
Course-20	
Course Code:	A30404
Course Title:	DIGITAL LOGIC DESIGN
Theory/ Laboratory:	Theory

Course Outcomes	
CO-1	Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions
CO-2	Make use of k-map and tabulation methods to minimize Boolean functions and to implement with logic gates.
CO-3	Analyze basic components used in digital systems such as adder, subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters.
CO-4	Distinguish combinational and sequential logic in terms of their functions
CO-5	Design various PLDs such as ROMs, PALs, PLAs and PROMs.
Course-21	
Course Code:	A30405
Course Title:	SIGNALS AND SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Distinguish between different signals and systems.
CO-2	Make use of Fourier series for the representation of signals.
CO-3	Make use of Fourier series for the representation of signals.
CO-4	Examine the transmission characteristics of linear systems.
CO-5	Select an appropriate transform to find the transfer function of linear systems.
Course-22	
Course Code:	A2404
Course Title:	PROBABILITY THEORY AND STOCHASTIC PROCESSES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply different probability techniques to observe the different events.
CO-2	Determine the characteristics of random variables and random processes.
CO-3	Classify the random processes by using different techniques.
CO-4	Analyze the temporal and spectral characteristics of stochastic processes.
CO-5	Develop the relationship between the input and output statistical characteristic of a linear system.
Course-23	
Course Code:	A2405
Course Title:	ELECTRONIC DEVICES AND CIRCUITS LABORATORY
Theory/ Laboratory:	Laboratory

Course Outcomes	
CO-1	Identify various electronic components and measuring equipment.
CO-2	Analyze the V-I characteristics of electronic devices.
CO-3	Measure the ripple content present in rectifiers with and without filters.
CO-4	Construct single stage amplifier circuits and plot transient and frequency response.
Course-24	
Course Code:	A2406
Course Title:	DIGITAL LOGIC DESIGN LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Make use of LabVIEW software to construct combinational and sequential circuits.
CO-2	Test and Debug the combinational and sequential circuits using LabVIEW Software.
CO-3	Analyze virtual lab demo for Boolean relations using digital comparators.
CO-4	Develop LabVIEW based projects using LabVIEW Software.
Course-25	
Course Code:	A2407
Course Title:	BASIC SIMULATION LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Develop programs to generate different signals.
CO-2	Compile programs to perform different operations on signals and sequences
CO-3	Analyze different responses of the systems and spectrums of the signals.
CO-4	Estimate the mean skew, kurtosis, and probability distribution function of Gaussian noise.
Course-26	
Course Code:	A2017
Course Title:	QUANTITATIVE APTITUDE AND REASONING – I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify the problems by applying mathematical fundamentals..
CO-2	Apply the suitable logical methods to solve the problems.
CO-3	Solve the various problems by using quantitative mathematical fundamentals
CO-4	Analyse the comprehensive data with logical ability.

Course-27	
Course Code:	A2032
Course Title:	HUMAN VALUES AND PROFESSIONAL ETHICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply human values and ethics in professional life.
CO-2	Develop the moral ideals to maintain good relationships with people
CO-3	Solve environmental related problems by keeping health of human being into consideration.
C0-4	Make use of the fundamental rights and human rights in life for individual dignity
C0-5	Build the sound health system both physically and mentally by practicing yoga, karate, sports etc.
Course-28	
Course Code:	A2213
Course Title:	CONTROL SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Determine the transfer function of a given system using different techniques.
C0-2	Analyze the response of a given system in time and frequency domains.
C0-3	Test the stability, observability and controllability of a given system.
C0-4	Apply suitable technique for calculating the gain margin and phase margin of a given system. ENGINEE L
Course-29	
Course Code:	A2410
Course Title:	ELECTROMAGNETICS AND TRANSMISSION LINES
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply various laws of electrostatics and magnetostatics to deduce Maxwell's equations in static and time variants fields.
C0-2	Develop boundary conditions for different combinations of media.
C0-3	Make use of Maxwell's equations to deduce EM wave equations.
C0-4	Develop expressions for primary and secondary parameters of transmission line using conventional and graphical methods.
C0-5	Derive continuity equation, Poisson's, Laplace's equation and Poynting theorem to characterize field.
Course-30	
Course Code:	A2411
Course Title:	ELECTRONIC CIRCUIT ANALYSIS

Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Analyze the small signal models of BJT amplifiers at high frequencies.
C0-2	Analyze the frequency response of single and multi-stage amplifiers with compound connections.
CO-3	Classify amplifiers based on feedback mechanism.
CO-4	Evaluate the efficiency of large signal amplifiers.
CO-5	Explain the concept of resonant frequency in tuned amplifiers..
Course-31	
Course Code:	A2412
Course Title:	ANALOG COMMUNICATION SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Explain the operation of different analog communication systems.
CO-2	Analyze the performance of different modulation schemes used in analog communication systems.
CO-3	Make use of sampling theorem to generate pulse modulation signals.
CO-4	Analyze the performance of AM, FM and PM receivers in the presence of noise.
CO-5	Choose an appropriate modulation technique to design an analog communication system.
Course-32	
Course Code:	A2413
Course Title:	INTERNET OF THINGS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze IoT applications using IoT design principles, protocols and levels.
CO-2	Distinguish sensors and actuators in terms of their functions and applications.
CO-3	Interface I/O devices, Sensors using Arduino uno.
CO-4	Apply Python concepts for programming of Raspberry Pi.
CO-5	Develop IoT applications using Raspberry Pi and Arduino uno.
Course-33	
Course Code:	A2414
Course Title:	ELECTRONIC CIRCUIT ANALYSIS LABORATORY

Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Design single and multistage amplifiers at low, mid and high frequencies.
C0-2	Determine the gain of feedback amplifiers and efficiency of power amplifiers.
C0-3	Design oscillator circuits for given frequency of oscillation.
C0-4	Compare the frequency response of tuned amplifiers..
C0-5	Analyze all the electronic circuits using simulation software and hardware.
Course-34	
Course Code:	A2415
Course Title:	ANALOG COMMUNICATION SYSTEMS LABORATORY
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Analyze the performance of different continuous modulation and demodulation schemes..
C0-2	Sketch the characteristics of mixer, pre-emphasis and de-emphasis.
C0-3	Explainthe basic physical principles underlying the mechanical properties of materialsinfluencing efficacy of product.
C0-4	Compute the specifications of a phase locked loop.
C0-5	Analyze the performance of different pulse modulation Schemes.
Course-35	
Course Code:	A2416
Course Title:	INTERNET OF THINGS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Develop embedded C Programs using Arduino UNO and IDE.
C0-2	Execute Arduino C programs for blink LED, push button, potentiometer, fade LED, LDR, serial interface, LCD, DHT sensor.
C0-3	Build Programs of Raspberry-Pi using python.
C0-4	Interface LEDs, Push Buttons, Potentiometer to Raspberry-Pi.
C0-5	Test and Debug Arduino UNO embedded C and Raspberry-Pi python Programs.
Course-36	
Course Code:	A2018
Course Title:	QUANTITATIVE APTITUDE AND REASONING – II
Theory/ Laboratory:	Theory
Course Outcomes	

C0-1	Solve environmental problems through higher level of personal involvement and interest.
C0-2	Apply ecological morals to keep up amicable connection among nature and human beings.
C0-3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
C0-4	Apply environmental laws for the protection of environment and wildlife.
C0-5	Influence society in proper utilization of goods and services.

Course-37	
Course Code:	A2031
Course Title:	ENVIRONMENTAL SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Solve environmental problems through higher level of personal involvement and interest..
C0-2	Apply ecological morals to keep up amicable connection among nature and human beings.
C0-3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
C0-4	Apply environmental laws for the protection of environment and wildlife.
C0-5	Influence society in proper utilization of goods and services.

R20 REGULATIONS

Course-38	
Course Code:	A30425
Course Title:	ANTENNAS AND WAVE PROPAGATION
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Compare the performance of different antennas using antenna parameters.
C0-2	Analyze dipole and array antennas by computing fields, radiated power and radiation resistance.
C0-3	Select appropriate antenna for a specific application like TV, AM/FM radio, radar, satellite link.
C0-4	Design horn, helical and reflector antennas for VHF, UHF and microwave communication applications.
C0-5	Formulate the design equations of microstrip antennas for a given application.
Course-39	

Course Code:	A30427
Course Title:	LINEAR INTEGRATED CIRCUIT APPLICATIONS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the characteristics of operational amplifier
CO-2	Design different amplifier and oscillator circuits using op-amp.
CO-3	Make use of IC 555 and PLL effectively in communication systems.
CO-4	Construct different active filters using op-amp.
CO-5	Design different analog to digital and digital to analog converters effectively.
Course-40	
Course Code:	A30426
Course Title:	DIGITAL COMMUNICATION SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze different digital modulation techniques to convert analog signals to digital form.
CO-2	Distinguish between baseband and passband transmission techniques in terms of SNR and BER.
CO-3	Examine the concepts of geometric representation of signals and constellation diagrams
CO-4	Compare digital carrier modulation schemes in terms of bandwidth, complexity and spectral efficiency.
CO-5	Interpret the differences between linear block codes and convolutional codes for noisy and noiseless channels.
Course-41	
Course Code:	A30429
Course Title:	LINEAR INTEGRATED CIRCUIT APPLICATIONS LABORATORY
Theory/ Laboratory:	LABORATORY
Course Outcomes	
CO-1	Implement different configurations of operational amplifiers.
CO-2	Generate various shapes of signals using op-amps and timers.
CO-3	Construct and analyse various active filters and data converters using op-amp.
CO-4	Analyze the characteristics and applications of PLL.

Course-42	
Course Code:	A30428
Course Title:	DIGITAL COMMUNICATION SYSTEMS LABORATORY
Theory/ Laboratory:	LABORATORY
Course Outcomes	
CO-1	Demonstrate the working of various digital modulation and demodulation schemes.
CO-2	Design various digital modulation schemes to obtain desired modulation index.
CO-3	Analyze the performance of time division multiplexing and demultiplexing.
CO-4	Study and verify sampling theorem
CO-5	Verify digital modulation techniques using MATLAB.

Course-43	
Course Code:	A30430
Course Title:	PYTHON FULL STACK
Theory/ Laboratory:	THEORY
Course Outcomes	
CO-1	Develop front end of an application using HTML, CSS and JavaScript along with ReactJs.
CO-2	Develop back end of an application using NodeJs.
CO-3	Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.
CO-4	Develop a website and deploy on a web server.
CO-5	Authenticate, store, and structure user data.

Course-44	
Course Code:	A30033
Course Title:	INDIAN CONSTITUTION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand historical background of the constitution making and its importance for
CO-2	Explain the role of President and Prime Minister.
CO-3	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-4	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO-5	Analyze the decentralization of power between central, state and local self government.

CO-6	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
Course-45	
Course Code:	A30432
Course Title:	DIGITAL SIGNAL PROCESSING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the Discrete Fourier Transform to represent the signals in frequency domain.
CO-2	Analyze various DFT algorithms and their applications.
CO-3	Analyze various realization forms of FIR and IIR Filters.
CO-4	Design digital FIR and IIR filters and analyze their performances.
CO-5	Apply the concepts of multirate signal processing to implement digital filters.
Course-47	
Course Code:	A30434
Course Title:	CMOS VLSI DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the electrical properties of MOS transistors
CO-2	Apply various CMOS processing techniques to fabricate NMOS, PMOS and CMOS Devices
CO-3	Analyze the DC and transient characteristics of CMOS logic gates
CO-4	Build logic circuits using transmission gate logic
CO-5	Make use of charge leakage and charge sharing concepts to design dynamic logic Circuits
Course-48	
Course Code:	A30433
Course Title:	MICROPROCESSORS AND MICROCONTROLLERS
Theory / Laboratory:	Theory
Course Outcomes	
CO-1	Analyze 8086 microprocessor and MSP430 microcontroller architectures.
C0-2	Develop programs using 8086 microprocessor and MSP430 microcontroller.
C0-3	Make use of peripherals of MSP430 to interface I/O devices
C0-4	Apply serial communication protocols for interfacing serial devices.
C0-5	Design embedded applications using MSP430 microcontroller.

Course-49	
Course Code:	A30435
Course Title:	DIGITAL SIGNAL PROCESSING LABORATORY
Theory/ Laboratory:	LABORATORY
Course Outcomes	
C0-1	Evaluate the DFT and IDFT of given signals using MATLAB.
C0-2	Analyze various DFT algorithms and their applications.
C0-3	Design IIR and FIR digital filters for the given specifications using MATLAB.
C0-4	Apply the concepts of multirate signal processing using MATLAB.
C0-5	Demonstrate real-time signal Processing applications with DSK kit (TMS320C6713) and Code Composer Studio.
Course-SO	
Course Code:	A30510
Course Title:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY
Theory/ Laboratory:	LABORATORY
Course Outcomes	
C0-1	Design solutions for the problems of general purpose applications using object oriented Concepts
C0-2	Generate reusable code using inheritance, user defined packages and interfaces
C0-3	Write robust and efficient code using exception handling and multithreading concepts
C0-4	Implement collection frameworks and file handling techniques to store and retrieve Data
C0-5	Design user interface using swings
Course-SI	
Course Code:	A30436
Course Title:	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY
Theory/ Laboratory:	LABORATORY
Course Outcomes	
C0-1	Develop assembly language programs using EMU8086 emulator.
CO-2	Execute 8086 ALPs for arithmetic, logical, string, call operations.
CO-3	Build programs of MSP430 using embedded C.
CO-4	Interface LEDs, push buttons, potentiometer to MSP430.
CO-5	Test and debug 8086 ALPs and MSP430 embedded C programs.

Course-52	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a better understanding of important issues related to gender in contemporary India
CO-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
CO-3	Acquire insight into the gendered division of labour and its relation to politics and Economics
CO-4	Equip to work and live together as equals
CO-5	Develop a sense of appreciation of women in all walks of life
Course-53	
Course Code:	A30524
Course Title:	R PROGRAMMING
Theory /Laboratory:	Theory
Course Outcomes	
CO-1	Understand and apply the basics in R programming in terms of constructs, control statements, string functions
CO-2	Apply the functions on matrix rows and columns and list operators
CO-3	Work on Data frames and tabular type of DATA
CO-4	Understand and write reliable code using OOP concepts in R
CO-5	Understand and apply R Interfaces for Other languages

R19 REGULATIONS	
Course-I	
Course Code:	A2019
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization.
CO-2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact.
CO-3	Classify the market structure to decide the fixation of suitable price
CO-4	Apply capital budgeting techniques to select best investment opportunity
CO-5	Analyze and prepare financial statements to assess financial health of business

Course-2	
Course Code:	A2434
Course Title:	DIGITAL IMAGE PROCESSING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Demonstrate different operations on image pixels
CO-2	Distinguish between different types of image transforms
CO-3	Compare different image enhancement techniques
CO-4	Apply different techniques to perform image segmentation.
CO-5	Contrast between different color models and compression techniques.
Course-3	
Course Code:	A2435
Course Title:	EMBEDDED SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the embedded systems features and architecture considerations
CO-2	Develop Programs using TM4C123GH6PM Microcontroller
CO-3	Make use of Peripherals of TM4C123GH6PM to interface I/O Devices
CO-4	Interpret the importance of functions in programming
CO-5	Design Embedded Applications using TM4C123GH6PM Controller
Course-4	
Course Code:	A2436
Course Title:	EMBEDDED SYSTEMS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Build Embedded C Programs using TM4C123GH6PM microcontroller.
CO-2	Execute TM4C123GH6PM Programs using Code Composer Studio.
CO-3	Interface LEDs, Push Buttons, Potentiometer to TM4C123GH6PM.
CO-4	Test and Debug TM4C123GH6PM Programs using Code Composer Studio.
CO-5	Develop embedded systems applications using TM4C123GH6PM.
Course-5	

Course Code:	A1435
Course Title:	SIGNAL AND IMAGE PROCESSING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Compile programs to perform DFT, IDFT and FFT a given sequence.
CO-2	Design different filters in discrete time domain
CO-3	Perform simple welding operations to join to metal pieces
CO-4	Preform different operations on images using MATLAB.
CO-5	Analyze the histogram of given images.
Course-6	
Course Code:	A1451
Course Title:	DATA COMMUNICATIONS AND NETWORKING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the layers of reference models used for communication in various networks.
CO-2	Apply the principles of error detection and correction to transfer data without errors.
CO-3	Interpret various IEEE standards and channelization protocols.
CO-4	Understands about files and its applications.
CO-5	Analyze the issues with host naming, addressing, and routing packets in internet.
CO-6	Inspect the process to delivery data using TCP and UDP in transport layer.
Course-7	
Course Code:	A1452
Course Title:	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the performance characteristics of different measurement instruments and their errors.
CO-2	Analyze the function of CRO used to measure frequency, amplitude and phase.
CO-3	Compare the operation of different signal generators and wave form analysers.
CO-4	Select an appropriate bridge network for the measurement of electrical quantities.
CO-5	Make use of Sensors and transducers to measure the required physical quantities.
Course-8	
Course Code:	A1453

Course Title:	ADVANCED DIGITAL SYSTEM DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Compare the performance of various digital logic families.
CO-2	Compare the performance of various digital logic families.
CO-3	Apply the sequential network to solve synchronous & asynchronous design behaviour.
CO-4	Design advanced digital systems using finite state machines.
CO-5	Design complex circuits using programmable logic devices.
Course-9	
Course Code:	A1454
Course Title:	INTERNET OF THINGS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze IoT applications using IoT design principles, protocols and levels.
CO-2	Distinguish sensors and actuators in terms of their functions and applications.
CO-3	Interface I/O devices, Sensors using Arduino uno.
CO-4	Apply Python concepts for programming of Raspberry Pi.
CO-5	Develop IoT applications using Raspberry Pi and Arduino uno..
Course-IO	
Course Code:	A1455
Course Title:	MICROWAVE ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze rectangular waveguide transmission line characteristics using concepts of Electromagnetic theory.
CO-2	Evaluate relation between input(s) and output(s) of microwave passive components using scattering parameters.
CO-3	Compare performance of O-type and M-type microwave tubes.
CO-4	Sketch the characteristics of microwave solid state devices.
CO-5	Measure microwave parameters using microwave bench setup.
Course-11	
Course Code:	A1456
Course Title:	NANOTECHNOLOGY
Theory/ Laboratory:	Theory

Course Outcomes	
CO-1	Distinguish between different types of materials and their propertie
CO-2	Compare different types of nanomaterials.
CO-3	Analyze different properties of nanomaterials.
CO-4	Contrast between different types of carbon nanotubes.
Course-12	
Course Code:	A1457
Course Title:	SYSTEM VERILOG AND VERIFICATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop language constructs of System Verilog HDLs and implements a digital logic effectively.
CO-2	Utilize assertions to quickly correct behavior in simulation.
CO-3	Design an interface between the System Verilog test program and the Device Under Test.
CO-4	Construct a device driver routines to drive DUT input with stimulus from generator.
CO-5	Execute device drivers, monitors and self-checking routines concurrently.
Course-13	
Course Code:	A1458
Course Title:	REAL TIME OPERATING SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Compare and contrast a real time operating system with other operating system.
CO-2	Design the applications to run in parallel either using processes or threads.
CO-3	Develop a practical real time system by using optimal core elements.
CO-4	Analyze the scheduling schemes for packet switching networks and protocols for the broadcast networks.
CO-5	Test for the performance analysis of different real time systems.
Course-14	
Course Code:	A1459
Course Title:	RADAR ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Distinguish various radar systems and trackers based on characteristics and applications.
CO-2	Derive modified radar range equation and characteristics equation of Matched

	Filter.
CO-3	Derive range, relative velocity and angle error for different radars.
CO-4	Analyze the functionality of various elements of the radar receiver.
Course-15	
Course Code:	A1460
Course Title:	BIOMEDICAL SIGNAL PROCESSING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the nature of biomedical signals and related concepts.
CO-2	Apply averaging technique on biomedical signals and extract the features.
CO-3	Design various time domain filtering techniques for the removal of artefact from biomedical signal.
CO-4	Apply signal compression techniques on biomedical signals
CO-5	Analyze event detection techniques for EEG and ECG signals.
Course-16	
Course Code:	A1461
Course Title:	FPGA Design
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Discuss different PLDs based on real time applications and compare its architectures.
CO-2	Analyze the programmable technologies used in FPGAs.
CO-3	Design combinational and sequential circuits using FPGA.
CO-4	Distinguish between technology dependent and technology independent optimizations while implementing logic in FPGA.
CO-5	Make use of finite state machines to design applications on FPGA.
Course-17	
Course Code:	A1462
Course Title:	EMBEDDED HARDWARE AND SOFTWARE CO-DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply techniques for the concurrent design or co-design of embedded systems that are dedicated to specific applications.
CO-2	Apply hardware and software design techniques for construction of embedded systems.
CO-3	Distinguish various target architectures based on architecture specialization techniques.

CO-4	Discuss modern design methodologies with an emphasis on early design phases, including modeling, verification and system-level synthesis.
Course-I8	
Course Code:	A1463
Course Title:	CELLULAR AND MOBILE COMMUNICATIONS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the cellular mobile system design concepts to improve the signal to noise ratio and cell coverage.
CO-2	Interpret the Co-channel interferences and their parameters to improve the system capacity.
CO-3	Illustrate the importance of cell coverage for signal and traffic, diversity techniques and mobile antennas to a caller.
CO-4	Utilize the Omni directional and directional antennas to improve the channel capacity and interference reduction.
CO-5	Demonstrate the Interim Standard, Digital Enhanced Cordless System, multiple access schemes of the wireless networks and standards and types of handoff.
Course-19	
Course Code:	A1464
Course Title:	SPEECH PROCESSING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Summarize the concepts of speech signals and their applications.
CO-2	Analyze the speech signals by using different transform techniques.
CO-3	Distinguish between different cepstrums of speech signals.
C0-4	Compare different speech coding techniques.
CO-5	Contrast different speech prediction techniques.
Course-20	
Course Code:	A1465
Course Title:	LOW POWER VLSI DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Comprehend different sources of power dissipation.
CO-2	Realize switched capacitance and arrive at ways to minimize.
CO-3	Analyze and minimize dynamic and static power consumption in VLSI circuits.
CO-4	Outline the working principles of adiabatic logic.
CO-5	Establish ways to minimize power in software design.
Course-21	
Course Code:	A1466
Course Title:	DEVELOPMENT OF SECURE EMBEDDED SYSTEMS

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the embedded systems security concepts.
CO-2	Utilize the systems software considerations for embedded security
CO-3	Make use of Development Tool Security to secure embedded software development.
CO-4	Apply Cryptographic concepts for embedded systems security.
CO-5	Analyze the data protection protocols.
Course-22	
Course Code:	A1467
Course Title:	SATELLITE COMMUNICATIONS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the functionality of various elements of satellite communication system.
CO-2	Apply launching procedures and Ephemeris data to place and locate satellite in the orbit.
CO-3	Create link budgets to meet specific objectives for C/N.
CO-4	Analyze the various GNSS constellations used for navigation.
CO-5	Differentiate various access techniques used for communication.
Course-23	
Course Code:	A1468
Course Title:	PATTERN RECOGNITION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze curve fitting and decision theory by using different distribution functions.
CO-2	Compare different parameters of linear regression models.
CO-3	Distinguish between different linear regression models.
CO-4	Construct different graphical models for pattern recognition.
Course-24	
Course Code:	A1469
Course Title:	DIGITAL VLSI TESTING

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Detect faults occurring in digital systems and modelling of the faults to simplifying the detection.
CO-2	Generate test vectors to detect and diagnose the faults using various algorithms.
CO-3	Design testable Combinational and Sequential circuits using Logic BIST architectures
CO-4	Develop testable circuits and find the output response of the stimulus compression..
CO-5	Design testable memory units..

Course-25	
Course Code:	A1470
Course Title:	EMBEDDED SYSTEMS DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the embedded systems components and microcontroller selection.
CO-2	Distinguish interrupts in terms of their functions and applications.
CO-3	Make use of memory addressing concepts to embedded system design.
CO-4	Apply system boot concepts for embedded systems design.
CO-5	Differentiate debouncing techniques and switch types.

Program Educational Objectives (PEO's):
The Programme Educational Objectives (PEO's) of the under graduate programme in Electronics and Communication Engineering at G.Pullaiah College of Engineering and Technology, Kurnool are to prepare the graduates to possess the ability to
PEO 1: Apply the principles of basic engineering sciences in performing professional tasks in Electronics and Communication Engineering and to develop awareness on societal concerns.
PEO 2: Demonstrate problem-solving abilities that permit to contribute in a variety of signal processing, design of circuitry and academic careers.
PEO 3: Thrive in diverse, global, and multidisciplinary environments with team spirit for successful completion and management of electronic projects.
PEO 4: Participate in lifelong-learning activities to enhance professional and ethical development.
Program outcomes (PO's):
On completion of the course the student will be able to :
PO 1-Engineering Knowledge: Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering problems.

PO 2-Problem analysis: Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3-Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO 4-Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5-Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6-The engineer and society: Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7-Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
PO 8-Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9-Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10-Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give receive clear instructions.
PO 11-Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12-Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
Program Specific Outcomes(PSO's):
PSO 1: Apply the principles of Electronics, Analog and Digital Systems in the potential fields of Consumer Electronics , Medical and Defence.
PSO 2: Get profound knowledge in Communications, Signal and Image Processing along with programming & Simulation tools for research advancement.

DEPARTMENT OF CSE	
COURSE OUTCOMES (R20Regulation)	
Course-I	
Course Code:	**A30002**
Course Title:	MATHEMATICS – I
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.
CO-2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
CO-3	Utilize mean value theorems to real life problems
CO-4	Familiarize with functions of several variables which is useful in optimization..
CO-5	Apply important tools of calculus in higher dimensions and will become familiar with 2-dimensional coordinate systems.
CO-6	Analyze 3- dimensional coordinate systems and utilization of special functions.
Course-2	
Course Code:	**A30004**
Course Title:	**APPLIED PHYSICS**
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret the properties of light waves and its interaction of energy with the matter
CO-2	Explain the principles of physics in dielectrics and magnetic materials.
CO-3	Apply electromagnetic wave propagation in different guided media.
CO-4	Calculate conductivity of semiconductors
CO-5	Interpret the difference between normal conductor and super conductor
CO-6	Elucidate the applications of nano materials
Course-3	
Course Code:	A30501
Course Title:	PYTHON PROGRAMMING

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Comprehend the fundamental concepts of computer hardware and problem solving Abilities. .
CO-2	Knowledge on the basic concepts of algorithms, flow charts and python programming. .
CO-3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
CO-4	Interpret the importance of functions in programming .
CO-5	Analyze and modularize the problem and its solution by using functions.
CO-6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications. .
Course-4	
Course Code:	A30001
Course Title:	COMMUNICATIVE ENGLISH
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Remember the concepts which the student has learnt previously and identifying their connection.
CO-2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO-3	Apply grammatical structures to formulate sentences and correct word forms
CO-4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO-5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts. .
CO-6	Create a coherent paragraph interpreting a figure/graph/chart/table.
Course-5	
Course Code:	A30301
Course Title:	ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO-2	Apply orthographic projection concepts to draw projections of points, lines, planes and solids.
CO-3	Apply development concepts to draw development of surfaces of simple solids.

CO-4	Apply isometric projection concepts to draw isometric projections of right regular solids.
CO-5	Apply orthographic projection concepts to convert isometric view to orthographic views.
CO-6	Make use of AutoCAD Software to draw 2D diagrams of various objects

Course-6	
Course Code:	A30006
Course Title:	COMMUNICATIVE ENGLISH LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO-2	Apply communication skills through various language learning activities
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO-4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO-5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO-6	Improve upon speaking skills over telephone, role plays and public speaking
Course-7	
Course Code:	A30008
Course Title:	APPLIED PHYSICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Operate optical instruments like Travelling microscope and spectrometer
CO-2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO-3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO-4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO-5	Evaluate the acceptance angle of an optical fiber and numerical aperture
CO-6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor
Course-8	

Course Code:	A30502
Course Title:	PYTHON PROGRAMMING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design solutions to mathematical problems & Organize the data for solving the Problem.
CO-2	Understand and implement modular approach using python
CO-3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc.
CO-4	Understands about files and its applications..
CO-5	Develop real-world applications, files and exception handling provided by python.
CO-6	Select appropriate programming construct for solving the problem
Course-9	
Course Code:	A30010
Course Title:	MATHEMATICS – II
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the mathematical principles to solve second and higher order differential equations.
CO-2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO-3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO-4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
CO-5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities.
CO-6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.
Course-IO	
Course Code:	A30005
Course Title:	CHEMISTRY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.

CO-2	To differentiate between pH metry, Potentiometric and conductometric titrations.
CO-3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers..
CO-4	Understand the principles of different analytical instruments and explain their applications.
CO-5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
CO-6	Explain of different types of colloids, their preparations, properties and applications
Course-11	
Course Code:	A30503
Course Title:	DATA STRUCTURES USING C
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Learn to choose appropriate data structure as applied to specified problem definition.
CO-2	Design and analyse linear and non-linear data structures..
CO-3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.
CO-4	Demonstrate advantages and disadvantages of specific algorithms and data Structures.
CO-5	Develop programs for efficient data organisation with reduce time complexity
CO-6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
Course-12	
Course Code:	A30203
Course Title:	BASIC ELECTRICAL & ELECTRONICS ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	State the basic laws and usage of components in electric circuits..
CO-2	Investigate DC and AC circuits using different methods and laws.
CO-3	Analyze the principle of operation of DC machines and AC machines along with the various tests to predetermine the efficiency and regulation..
CO-4	Understand the theory, operation and applications of semiconductor devices.
CO-5	Determine various parameters of rectifier circuits using with and without filters..

CO-6	Analyze and Design different oscillator circuits, op-amps and the characteristics of BJT, FET to meet the given specifications.
Course-13	
Course Code:	A30302
Course Title:	ENGINEERING WORKSHOP
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply wood working skills to make products.
CO-2	Perform metal cutting operations in the fitting section to make models.
CO-3	Perform simple welding operations to join to metal pieces.
CO-4	Apply sheet metal working skills to make required models.
CO-5	Evaluate the performance analysis of various pumps and turbines..
CO-6	Perform general maintenance works on own at house/ work place.
Course-14	
Course Code:	A30009
Course Title:	CHEMISTRY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	|Understand the determine the cell constant and conductance of solutions.
CO-2	Prepare advanced polymer materials.
CO-3	Measure the strength of an acid present in secondary batteries
CO-4	Understand and apply the pH metric titrations.
CO-5	Verify Lambert-Beer'slaw.
CO-6	Potentiometry - determination of redox potentials and EMFs
Course-15	
Course Code:	A30504
Course Title:	DATA STRUCTURES LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Learn to choose appropriate data structure as applied to specified problem definition.
CO-2	Design and analyse linear and non-linear data structures.
CO-3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs.

CO-4	Demonstrate advantages and disadvantages of specific algorithms and data Structures..
CO-5	Develop programs for efficient data organisation with reduce time complexity.
CO-6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.
Course-16	
Course Code:	A30204
Course Title:	BASIC ELECTRICAL AND ELECTRONICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Practically verify Superposition,Thevenin's, Noton's theorems and Open and Short circuit parameters.
CO-2	Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator by using Swinburne's test.
CO-3	Predetermine the Efficiency and Regulation at any given load and Power Factor of a transformer by using OC & SC tests.
CO-4	Analyze the V-I characteristics of P -N Junction Diode and Zener Diode.
CO-5	Analyze the input and output characteristics of BJT, Common Source Configuration Output and Transfer Characteristics of JFET.
CO-6	Determine the ripple content present in half-wave and full-wave rectifiers using with and without filters.
Course-17	
Course Code:	A30032
Course Title:	UNIVERSAL HUMAN VALUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the significance of value inputs in a classroom and start applying them in their life and profession.
CO-2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc..
CO-3	Understand the value of harmonious relationship based on trust and respect in their life and profession
CO-4	Understand the role of a human being in ensuring harmony in society and nature.
CO-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they

	work.
CO-6	Analyze the value of maintaining ethical values in critical situations
Course-I8	
Course Code:	A30019
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO-2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
CO-3	Classify the market structure to decide the fixation of suitable price
CO-4	Apply capital budgeting techniques to select best investment opportunity
CO-5	Analyze and prepare financial statements to assess financial health of business..
Course-19	
Course Code:	A30506
Course Title:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply object oriented concepts for solving general purpose problems
CO-2	Use inheritance, user defined packages and interfaces for code reusability
CO-3	Apply exception handling and multithreading for robust and efficient application development
CO-4	Implement collection frameworks to store and retrieve data efficiently
CO-5	Build GUI applications using swings for user interface design
Course-20	
Course Code:	A3050
Course Title:	DATABASE MANAGEMENT SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Apply suitable data model for given application
CO-2	Construct optimized SQL queries to solve real time problems
CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Use suitable transaction model to avoid Deadlock

CO-5	Choose appropriate index structure to improve performance
Course-21	
Course Code:	A30016
Course Title:	DISCRETE MATHEMATICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the logic statements and connectives to solve real time problems.
CO-2	Classify algebraic structure and relations for a given mathematical problem.
CO-3	Analyze the basic results in combinatorics and binomial thermos for accuracy.
CO-4	Apply various recurrence relations to find solutions for numeric sequences
CO-5	Apply graph theory techniques to solve network problems
Course-22	
Course Code:	A30421
Course Title:	DIGITAL ELECTRONICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Perform arithmetic operations on different number systems and to apply theprinciples of Boolean algebra to minimize logic expressions
CO-2	Make use of k-map and tabulation methods to minimize Boolean functions and toimplement with logic gates.
CO-3	Analyse basic components used in digital systems such as adder and subtractor,decoder, encoder, multiplexer, flip-flops, registers and counters
CO-4	Distinguish combinational and sequential logic in terms of their functions..
CO-5	Design various PLDs such as ROMs, PALs, PLAs and PROMs.
Course-23	
Course Code:	A30508
Course Title:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design solutions for the problems of general purpose applications using object oriented concepts.

CO-2	Generate reusable codes using inheritance, user defined packages and interface.
CO-3	Write robust and efficient code using exception handling and multithreading concepts.
CO-4	Implement collection frameworks and file handling techniques to store and retrieve data.
CO-5	Design user interface using swings
Course-24	
Course Code:	A30509–
Course Title:	DATABASE MANAGEMENT SYSTEMS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design Database tables for the given problem
CO-2	Use appropriate querying processing technique to access the data
CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Develop PL/SQL routines for reusability of code
CO-5	Apply appropriate triggering concepts for automation and performance.
Course-25	
Course Code: |A30422	
Course Title: |DIGITAL ELECTRONIC LABORATORY	
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design digital logic circuits using software.
CO-2	Verify the logical operations of the digital logic gates in the laboratory
CO-3	Analyze the functionality of Combinational and Sequential Circuits using LogiSIM
CO-4	Design and analyze the code converters using LogiSIM.
CO-5	Design and analyze the counters using LogiSIM..
Course-26	
Course Code:	A30510
Course Title:	ANDROID APPLICATION DEVELOPMENT
Theory/ Laboratory:	THEORY
Course Outcomes	
CO-1	Understand the different types of mobile devices.

CO-2	Learn how to apply Android Operating System onmobile.
CO-3	They can understand the systems mobile application distribution.
CO-4	Implementation of mobile design principles
CO-5	Implementation of prompt prototyping techniques to design and develop mobile interfaces
Course-27	
Course Code:	A30031
Course Title:	ENVIRONMENTAL SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Solve environmental problems through higher level of personal involvement and interest.
CO-2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO-3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
C0-4	Apply environmental laws for the protection of environment and wildlife.
C0-5	Influence society in proper utilization of goods and services.
Course-28	
Course Code:	A30011
Course Title:	PROBABILITY AND STATISTICS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Adopt correlation methods and principle of least squares, regression analysis.
C0-2	Apply discrete and continuous probability distributions.
C0-3	Classify the concepts of data science and itsimportance.
C0-4	Interpret the association of characteristics and through correlation and regression tools.
C0-5	Design the components of a classical hypothesistest
C0-6	Infer the statistical inferential methods based on small and large sampling tests
Course-29	
Course Code:	A30511
Course Title:	WEB TECHNOLOGIES
Theory/ Laboratory:	Theory
Course Outcomes	

C0-1	Construct a basic website using HTML and Cascading Style Sheets.
C0-2	Build dynamic web page using Java Script objects and event handling mechanisms.
C0-3	Develop server side programs using Servlets and Java Server Page.
C0-4	Construct web pages in PHP to represent data in XML format.
C0-5	Use AJAX and web services to develop interactive web applications
Course-30	
Course Code:	A30512
Course Title:	DESIGN AND ANALYSIS OF ALGORITHMS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Analyze the efficiency of algorithm for a given problem.
C0-2	Formulate the time order analysis for given algorithm.
CO-3	Identify the mathematical techniques required to prove the time complexity of an algorithm.
CO-4	Design appropriate algorithm to solve real world problems.
CO-5	Develop an application with the designed algorithms.
Course-31	
Course Code:	A30513
Course Title:	OPERATING SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the basic principles of Operating Systems in system programming
CO-2	Apply the processsynchronization conceptsin multiprogramming environment
CO-3	Solve thememorymanagement problems with paging and segmentation techniques
CO-4	Design algorithmic strategies to handle deadlock problems
CO-5	Implement the concepts of secured file system for confidentiality and authentication
Course-32	
Course Code:	A30514
Course Title:	SOFTWARE ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	Understand the various phases of software development life cycles and software Requirements
CO-2	Possess necessary skillsto elicitthe requirements of a software system and to create well written software documentation involving appropriate system models
CO-3	Design, implement and evaluate a computer based system, process, component or program tomeet desired needs within realistic constraints specific to the field
CO-4	Construct software projects by integrating components with appropriate user interface
Course-33	
Course Code:	A30515
Course Title:	WEB TECHNOLOGY LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Construct Web pages using HTML/XML and style sheets.
C0-2	Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
C0-3	Develop dynamic web pages using server side scripting
C0-4	Use PHP programming to develop web applications.
C0-5	Construct web applications using AJAX and web service
Course-34	
Course Code:	A30516 –
Course Title:	– DESIGN AND ANALYSIS OF ALGORITHMS
Theory/ Laboratory:	LABORATORY
Course Outcomes	
C0-1	Apply basic programming techniques in solving given problem
C0-2	Design an algorithm for a given application program.
C0-3	Utilize wrapper classes as per the demand of problem
C0-4	Apply the appropriate algorithmic technique for efficient problem solving.
C0-5	Execute collection classes for dynamic programming.
Course-35	
Course Code:	A30517
Course Title:	OPERATING SYSTEMS
Theory/ Laboratory:	LABORATORY

Course Outcomes	
C0-1	Apply appropriate CPU scheduling algorithm for the given problem..
C0-2	Perform resource management for optimal utility of CPU.
C0-3	Implement algorithms handling deadlock problems
C0-4	Implement the concepts ofsecured file system for confidentiality and authentication
C0-5	Apply threading conceptsto handle concurrency
Course-36	
Course Code:	A30518
Course Title:	WEB DESIGNING
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply the principles of creating an effective web page.
C0-2	Apply the elements of design with regard to the web.
C0-3	Create the language of the web: HTML and CSS.
C0-4	Develop skills in analyzing the usability of a web site
C0-5	Understand how to plan and conduct user related to web usability
R20 REGULATIONS	
Course-37	
Course Code:	A33503
Course Title:	COMPUTER NETWORKS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply the networking concepts in configuring the systems
C0-2	Illustrates error handling mechanism in data link layer
C0-3	Analyze the routing algorithms in finding the shortest path
C0-4	Apply transport protocols in network communications
C0-5	Implements domain name service and network security in the communication segment.
Course-38	
Course Code:	A30520
Course Title:	DATA MINING
Theory/ Laboratory:	Theory
Course Outcomes	

C0-1	Apply the principles of business intelligence in the commercial segment
C0-2	Make use of pre-processing techniques for data organization
C0-3	Implement association, clustering and rule based mining for Market based analysis
C0-4	Analyze the data mining classification technique for data differentiation
C0-5	Design the unsupervised clustering algorithms for data analysis
Course-39	
Course Code:	A30521
Course Title:	ARTIFICIAL INTELLIGENCE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply suitable search strategiesin finding better solutions for a given problem
CO-2	Analyze performance of an algorithm as per given parameters
CO-3	Analyze the efficient problem state space search for a problem
CO-4	Implement the appropriate AI techniques to solve uncertainty problems
CO-5	Apply AI techniques to solve real time problems
Course-40	
Course Code:	A30522
Course Title:	DATA MINING LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Execute data mining algorithms for extraction of appropriate datasets
CO-2	Apply data pre-processing techniques on raw input data for data cleansing
CO-3	Appraise the classification techniques on large datasets for differentiation
CO-4	Apply the data mining algorithms to perform association rule mining and clustering tasks
CO-5	Differentiate the outlier data from cluster data for statistical analysis
Course-41	
Course Code:	A30523
Course Title:	ARTIFICIAL INTELLIGENCE LABORATORY
Theory/ Laboratory:	Laboratory

Course Outcomes	
CO-1	Execute statistical problems to produce appropriate solutions
CO-2	Categorize the problem for selection of an appropriate algorithm
CO-3	Compare computational complexity of AI problems for better efficiency
CO-4	Demonstrate various AI algorithms based on empirical and theoretical proofs for performance statistics
Course-42	
Course Code:	A30524
Course Title:	R PROGRAMMING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand and apply the basics in R programming in terms of constructs, control statements, string functions
CO-2	Apply the functions on matrix rows and columns and list operators
CO-3	Work on Data frames and tabular type of DATA
CO-4	Understand and write reliable code using OOP concepts in R
CO-5	Understand and apply R Interfaces for Other languages
Course-43	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a better understanding of important issues related to gender in contemporary India
CO-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
CO-3	Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4	Equip to work and live together as equals
CO-5	Develop a sense of appreciation of women in all walks of life
Course-44	
Course Code:	A30525
Course Title:	CLOUD COMPUTING
Theory/ Laboratory:	Theory

Course Outcomes	
CO-1	Analyze cloud delivery models for better architecture.
CO-2	Implement infrastructure as a service model for industrial applications.
CO-3	Organize the cloud platform model for optimization services.
CO-4	Develop various application software with software as service.
CO-5	Design cloud computing reference architecture for delivery models.
Course-45	
Course Code: | A30526	
Course Title: | MOBILE APPLICATION DEVELOPMENT	
Theory / Laboratory:	Theory
Course Outcomes	
CO-1 | Able to recognize the importance of knowledge on Android programming basics	
CO-2	Able to construct the various aspects of user interfaces.
CO-3	Able to apply knowledge on displaying pictures, menus and data services.
CO-4	Able to develop application on content provider and messaging services.
CO-5	Able to substitute on the fundamentals of location based services, and creating your own services.
Course-46	
Course Code:	A30527
Course Title:	MACHINE LEARNING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Distinguish between, supervised, unsupervised and semi-supervised learning
CO-2	Apply the opt machine learning strategy for any given problem
CO-3	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
CO-4	Design a system that uses the appropriate graph models of machine learning
CO-5	Modify existing machine learning algorithms
Course-47	
Course Code:	A30528
Course Title:	CLOUD COMPUTING LABORATORY
Theory/ Laboratory:	Laboratory

Course Outcomes	
CO-1	Develop and deploy applications for better cloud utility
CO-2	Design web services for modern commercial applications
CO-3	Analyze the performance, scalability, and availability of the underlying cloud technologies for business requirements
CO-4	Implement software installation for utility of its applications
CO-5	Compare various cloud computing platforms for better cloud services
Course-48	
Course Code:	A30529
Course Title:	MOBILE APPLICATION DEVELOPMENT LAB
Theory / Laboratory:	Laboratory
Course Outcomes	
CO-1	Able to acquire practical knowledge on Android programming.
C0-2	Able to understand the implementation aspects of user interfaces.
C0-3	Able to understand the implementation of image view and persistent data services.
C0-4	Able to acquire practical knowledge on messaging services.
C0-5	Able to understand the practical exposure on implementation of location based services.
Course-49	
Course Code:	A30530
Course Title:	MACHINE LEARNING LAB
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Distinguish between, supervised, unsupervised and semi-supervised learning
C0-2	Apply the opt machine learning strategy for any given problem
C0-3	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
C0-4	Design a system that uses the appropriate graph models of machine learning
C0-5	Modify existing machine learning algorithms to improve classification efficiency
Course-50	
Course Code:	A30033
Course Title:	INDIAN CONSTITUTION AND MULTICULTURALISM

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Explain the role of President and Prime Minister.
CO-3	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-4	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO-5	Analyze the decentralization of power between central, state and local self-government.
CO-6	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
Course-5O	
Course Code:	A30551
Course Title:	DISTRIBUTED DATABASES
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Analyze distributed database design to address architectural issues
C0-2	Apply partitioning techniques to enhance data storage and security
C0-3	Design various query processing strategies for query optimization
C0-4	Develop a concurrent system for transaction management
C0-5	Design parallel architecture to counter the failures of parallel databases
Course-5I	
Course Code:	A30552
Course Title:	ENTERPRISE STORAGE SYSTEM
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the architecture of an intelligentstorage system for rapid data accessing
CO-2	Justify the implementation of storage solutions to enable business continuity
CO-3	Apply Storage Area Network for virtualization

CO-4	Design a storage solution based on organizations requirements
CO-5 management	|Provide Storage Infrastructure Virtualization for better storage
Course-52	
Course Code:	A30553
Course Title:	TCP/IP Protocol
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the layers of the OSI and TCP/IP for efficient data transmission.
CO-2	Distinguish between reliable and unreliable protocols for interconnections in application level and network level
CO-3	3 Design routing mechanisms for congestion avoidance
CO-4	Apply buffer management techniques to enhance performance
CO-5	Apply flow, error and congestion control mechanisms for efficient data transmission
Course-53	
Course Code:	A30554
Course Title:	ANGULAR
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply single-page application designs in developing web applications
CO-2	Implement the type scripts layersfor web applications
CO-3	Build Angular forms for client interaction
CO-4	Implement efficient Angular routings to protect components from unauthorized access
CO-5	Design view components for chatting applications
Course-54	
Course Code:	A30555
Course Title:	BIG DATA
Theory/ Laboratory:	Theory
Course Outcomes	
CO-l	Analyze distributed programs for formation of large scale clusters
CO-2	Apply enabling techniques of Hadoop and Map Reduce for distributed processing

CO-3	Assemble the components of Hadoop and its Eco-System for efficient data storage and processing
CO-4	Develop Map-Reduce programs in Java for performing large scale data analysis
CO-5	Apply K-means clustering and Mahout Techniques for efficient data analysis
Course-55	
Course Code:	A30556
Course Title:	PARALLEL ALGORITHMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Design parallel random access machines algorithms for standard problems and applications
CO-2	Analyze efficiency of different parallel algorithm
CO-3	Choose the mapping on multi computers for efficient data processing. (Assess multiprocessors and multicomputer for efficient data processing)
CO-4	Design the matrix algorithms to reduce complexity.
CO-5	Apply the graph algorithms to solve complex numeric problems
Course-56	
Course Code:	A30557
Course Title:	NETWORKING ARCHITECTURE AND DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply computer design and instruction set principles as per system requirements
CO-2	Analyze system requirements to remove redundancy
CO-3	Propose sub-netting and routing strategies in addressing architectural issues
CO-4	Apply network management mechanisms for data security and privacy
CO-5	Develop hybrid mechanisms for effective interconnection
Course-57	
Course Code:	A30558
Course Title:	DESIGN PATTERNS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the model-view-controller architecture for a given application
CO-2	Propose the most suitable design pattern to solve a design problem

CO-3	Inspect existing code to perform software refactoring
CO-4	Apply the basic design principles for quality software

R19 REGULATIONS

Course-58	
Course Code:	A2534
Course Title:	NATURAL LANGUAGE PROCESSING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand various phases in natural language processing.
CO-2	Understand different linguistic resources software tools.
CO-3	Understand parts of speech tagging with HMM, TBL.
CO-4	Illustrate natural language grammar and context free grammar.
CO-5	Understand applications of NLP and machine translation.

Course-59	
Course Code:	A2535
Course Title:	SOFTWARE TESTING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Derive test cases for any given problem
CO-2	Compare the different testing techniques to produce quality software.
CO-3	Identify the problem to its suitable testing model for error detection
CO-4	Apply the appropriate technique for the design of data flow and integration of software
CO-5	Create appropriate document for the software artifact

Course-60	
Course Code:	A2536
Course Title:	CRYPTOGRAPHY AND NETWORK SECURITY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand cryptography and network security concepts and application
CO-2	Apply security principles to system design
CO-3	Identify and investigate network security threat

CO-4	Analyze and design network security protocols
CO-5	Conduct research in network security
Course-61	
Course Code:	A2537
Course Title:	Software Testing Laboratory
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify the customer requirements for the given problem.
CO-2	Apply decision table testing for select problems
CO-3	Derive different test cases for any given problem
CO-4	Apply the appropriate testing technique for the design of flow graphs
CO-5	Create software testing document for the software artifact
Course-62	
Course Code:	A1535
Course Title:	MACHINE LEARNING LAB
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Distinguish between, supervised, unsupervised and semi-supervised learning
CO-2	Apply the opt machine learning strategy for any given problem
CO-3	Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
CO-4	Design a system that uses the appropriate graph models of machine learning
CO-5	Modify existing machine learning algorithms to improve classification efficiency
Course-63	
Course Code:	A1551
Course Title:	DISTRIBUTED DATABASES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze distributed database design to address architectural issues
CO-2	Apply partitioning techniques to enhance data storage and security
CO-3	Design various query processing strategies for query optimization
CO-4	Develop a concurrent system for transaction management

CO-5	Design parallel architecture to counter the failures of parallel databases
Course-64	
Course Code:	A1552
Course Title:	ENTERPRISE STORAGE SYSTEM
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the architecture of an intelligent storage system for rapid data accessing
CO-2	Justify the implementation of storage solutions to enable business continuity
CO-3	Apply Storage Area Network for virtualization
CO-4	Design a storage solution based on organizations requirements
CO-5	Provide Storage Infrastructure Virtualization for better storage management
Course-65	
Course Code:	A1553
Course Title:	TCP/IP Protocol
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the layers of the OSI and TCP/IP for efficient data transmission.
CO-2	Distinguish between reliable and unreliable protocols for interconnections in application level and network level
CO-3	Design routing mechanisms for congestion avoidance
CO-4	Apply buffer management techniques to enhance performance
CO-5	Apply flow, error and congestion control mechanisms for efficient data transmission
Course-66	
Course Code:	A1554
Course Title:	ANGULAR JS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply single-page application designs in developing web applications
CO-2	Implement the type scripts layers for web applications
CO-3	Build Angular forms for client interaction
CO-4	Implement efficient Angular routings to protect components from unauthorized access

CO-5	Design view components for chatting application
Course-67	
Course Code:	A1555
Course Title:	BIG DATA
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze distributed programs for formation of large scale clusters
CO-2	Apply enabling techniques of Hadoop and Map Reduce for distributed processing
CO-3	Assemble the components of Hadoop and its Eco-System for efficient data storage and processing
CO-4	Develop Map-Reduce programs in Java for performing large scale data analysis
CO-5	Apply K-means clustering and Mahout Techniques for efficient data analysis
Course-68	
Course Code:	A1556
Course Title:	PARALLEL ALGORITHMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Design parallel random access machines algorithms for standard problems and applications
CO-2	Analyze efficiency of different parallel algorithms
CO-3	Analyze efficiency of different parallel algorithms
CO-4	Design the matrix algorithms to reduce complexity.
CO-5	Apply the graph algorithms to solve complex numeric problems
Course-69	
Course Code:	A1557
Course Title:	NETWORKING ARCHITECTURE AND DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply computer design and instruction set principles as per system requirements
CO-2	Analyze system requirements to remove redundancy
CO-3	Propose sub-netting and routing strategies in addressing architectural issues
CO-4	Apply network management mechanisms for data security and privacy
CO-5	Develop hybrid mechanisms for effective interconnection

Course-70	
Course Code:	A1558
Course Title:	DESIGN PATTERNS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Apply the model-view-controller architecture for a given application
CO-2	Propose the most suitable design pattern to solve a design problem
CO-3	Inspect existing code to perform software refactoring
CO-4	Apply the basic design principles for quality software
Course-71	
Course Code:	A1559
Course Title:	DATA ANALYTICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Analyze different datasets, file types for effective data visualization
CO-2	Apply central limit theorem for summarizing data
CO-3	create connection between R and NoSQL Database for processing multidimensional data
CO-4	mplement correlation and regression models for better analysi
CO-5	Analyze various business problems for effective decision making
Course-72	
Course Code:	A1560
Course Title:	CLOUD CRYPTOGRAPHY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Apply various security mechanisms for the data stored in a cloud
CO-2	Inspect various classical encryption techniques and block cipher structure for data transmission
CO-3	Analyze advanced encryption standard, cryptographic hash functions and digital signatures for non-repudia
CO-4	Identify various attacks on virtualization systems
CO-5	Adapt modern security standards to achieve greater security
Course-73	

Course Code:	A1561
Course Title:	ETHICAL HACKING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze threats and attacks by cryptographic algorithms for robust applications
CO-2	Perform security auditing and testing to achieve full proof security system
CO-3	Identify issues related to ethical hacking to prevent system attacks
CO-4	Apply network defence measures to prevent hacking
CO-5	Implement penetration and security testing to overcome malware attacks
Course-74	
Course Code:	A1562
Course Title:	DevOps
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze DevOps methodologies in collaboration with the Development and Operations team
CO-2	Apply configuration management strategies for better integrations and deployment
CO-3	Make use of various DevOps tools to ease of collaboration and development
CO-4	Determine the speed of productivity for in-time delivery
CO-5	Determine the speed of productivity for in-time delivery
Course-75	
Course Code:	A1563
Course Title:	DATA VISUALIZATION TECHNIQUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Make use of Tableau for effective communication of data
CO-2	Create advanced visualizations, formatting and calculations using Tableau.
CO-3	Analyze changes in data visualization over time.
CO-4	Create different types of dash boards.
CO-5	Analyze and recommend effective business decisions/solutions using a systematic, evaluative, and information-based approach.
Course-76	
Course	A1564

Code:	
Course Title:	SOFTWARE DEFINED NETWORKS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Explain the key benefits of SDN by the separation of data and control planes.
CO-2	Interpret the SDN data plane devices and Openflow Protocols
CO-3	Implement the operation of SDN control plane with different controllers.
CO-4	Apply techniques that enable applications to control the underlying network using SDN
CO-5	Describe Network Functions Virtualization components and their roles in SDN
Course-77	
Course Code:	A1565
Course Title:	NATURAL LANGUAGE PROCESSING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Understand various phases in natural language processing
CO-2	Understand different linguistic resources software tools.
CO-3	Understand parts of speech tagging with HMM, TBL.
CO-4	llustrate natural language grammar and context free grammar.
CO-5	Understand applications of NLP and machine translation
Course-78	
Course Code:	A1566
Course Title:	SOLUTION STACK
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop front end of an application using HTML, CSS and JavaScript along with ReactJs
CO-2	Develop back end of an application using NodeJs
CO-3	Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone
CO-4	Develop a website and deploy on a web serve
CO-5	Authenticate, store, and structure user data.
Course-79	
Course Code:	A1567

Course Title:	DEEP LEARNING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the historical trends in deep learning and use Tensor flow for performing Linear Regression, Gradient Descent, optimizers, graph visualization
CO-2	Summarize the fundamentals of Artificial Neural Networks.
CO-3	Understand the training of Deep Neural Nets.
CO-4	Understand the Convolutional Neural Networks Architecture
CO-5	Understand the Recurrent Neural Networks and deep RNN training.
Course-80	
Course Code:	A1568
Course Title:	BLOCK CHAIN TECHNOLOGY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand and explore the process of Block chain technology in payment and funding processing
CO-2	Analyze the working of Smart Contracts
CO-3	Perform basic operations in hyper ledges and block chain networks
CO-4	Apply Ethereum and its Smart Contracts in application development
CO-5	Describe and deploy the smart contracts.
CO-6	Identify the risks involved in building Block chain applications.
Course-81	
Course Code:	A1569
Course Title:	CYBER SECURITY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze cyber-attack on different online web applications
CO-2	Apply different techniques to classify different types of cybercrimes
CO-3	Get an understanding over different government cyber laws and cyber forensics techniques
CO-4	Understand how to protect them self and ultimately society from cyber-attacks
CO-5	Understanding cybercrime investigating methods using previous case studies
Course-82	
Course	A1570

Code:	
Course Title:	USER INTERFACE DESIGN
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the concepts and principles of graphical user interface and its design process.
CO-2	Select appropriate tool for user interface design.
CO-3	Identify appropriate user devices for better user interaction
CO-4	Create effective screen design using screen elements, windows and components.
Course-83	
Course Code:	A1181
Course Title:	BASIC CIVIL ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Classify various materials and components used in building construction
CO-2	List out different domains like structural, transportation and geotechnical engineering in civil engineering stream
CO-3	Identify types of soils and foundations for various structures
CO-4	Measure the linear and angular parameters using concepts of surveying
CO-5	Develop water supply system for domestic and irrigational needs
Course-84	
Course Code:	A1182
Course Title:	BUILDING PLANNING & CONSTRUCTION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Plan buildings by adhering to laws laid by regulatory bodies
CO-2	Classify different masonry types of brick and stones used in construction
CO-3	Select appropriate floors and roofs for a proposed building
CO-4	Identify building materials which can be employed in construction
CO-5	Make use of damp proofing techniques to prevent ingress of water in buildings
Course-85	
Course Code:	A1183
Course Title:	DISASTER MANAGEMENT

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Classify different kind of hazards/disasters and their effects on environment
CO-2	Analyze the causes of hazards/disasters which effects human life
CO-3	Apply disaster management through engineering applications
CO-4	Apply suitable mitigation measures to minimize the effects of hazards and disasters
Course-86	
Course Code:	A1184
Course Title:	WATER RESOURCES CONSERVATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret ground and surface water utilization for conservation of water resources
CO-2	Apply the concepts of artificial ground water recharge to increase ground water level
CO-3	Make use of the concepts of harvesting for preservation of water
CO-4	Utilize new technologies like ion exchange and UV radiation techniques to recycle and reuse waste water
CO-5	Plan efficient use of water resources with minimum energy
Course-87	
Course Code:	A1281
Course Title:	FUNDAMENTALS OF ELECTRICAL ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.
CO-2	Analyse the electrical circuits using nodal analysis, mesh analysis and network theorems.
CO-3	Demonstrate the working principle and operation of DC machines, AC machines and single phase transformers
CO-4	Test the Performance of DC machines, AC machines and single phase transformers.
Course-88	
Course Code:	A1282
Course Title:	RENEWABLE ENERGY SOURCES
Theory/	Theory

Laboratory:	
Course Outcomes	
CO-1	Apply the principles of Renewable energy sources for the construction of Power generating station
CO-3	Analyze renewable energy sources for various environmental conditions
CO-4	Analyse the generation principles and operation of variety of sources of energy
Course-89	
Course Code:	A1283
Course Title:	ELECTRICAL MEASURING INSTRUMENTS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Categorise various electrical instruments used for measuring electrical parameters.
CO-2	Design appropriate arrangement for extension of range in measuring instruments
CO-3	Analyze the errors and compensations in various electrical measuring instruments
CO-4	Measure current, voltage, power and energy in 1-phase and 3-phase circuits.
CO-5	Estimate the unknown quantities of resistance, inductance and capacitance using bridge
Course-90	
Course Code:	A1381
Course Title:	OPTIMIZATION TECHNIQUES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply various operations research models and methods to real world problems.
CO-2	Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.
CO-3	Evaluate various alternatives available to find optimal solution for real world problems.
CO-4	Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.
CO-5	Decide the best operating policy for the efficient use of resources.
Course-91	
Course Code:	A1382
Course Title:	MECHANICAL TECHNOLOGY

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify the types of engines and their cycles
CO-2	Classify thereciprocating air compressors and their working principles.
CO-3	Discus the constructional features of domestic refrigeration and air conditioning systems
CO-4	Inspect the mechanism of power transmission elements of various engineering systems.
CO-5	Select suitable engineering materials and welding methods for real time applications.
Course-92	
Course Code:	A1383
Course Title:	INTRODUCTION TO AUTOMOBILE SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify the different parts of the automobile systems used in daily life
CO-2	Analyze brakes, steering, axles, suspension and frames of an engine for better performance.
CO-3	Inspect the mechanism of power transmission elements, and applications of various engineering systems
CO-4	Compare the significance of various engines in terms of their performance.
CO-5	Classify various electrical systems that are used for efficient functioning of automobiles
CO-6	
Course-93	
CourseCode:	A1481
Course Title:	BASIC ELECTRONICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the operation and characteristics of diodes and transistors.
CO-2	Analyze various applications of diodes and transistors
CO-3	Make use of Boolean algebra postulates to minimize boolean functions
CO-4	Construct and analyze various combinational and sequential circuits used in digital systems.
Course-94	
Course Code:	A1482

Course Title:	INTRODUCTION TO COMMUNICATION SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the operation of basic communication system.
CO-2	Compute the Fourier transform, energy and power of communications signals
CO-3	Compare the performance of different modulation schemes used in communication systems
CO-4	Differentiate time division and frequency division multiplexing techniques.
CO-5	Select an appropriate modulation technique while designing a communication system
Course-95	
Course Code:	A1483
Course Title:	FUNDAMENTALOF IOT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze IoT applications using IoT enablers and connectivity layers, components.
CO-2	Distinguish sensors and actuators in terms of their functions and application
CO-3	Interface I/O devices, Sensors using Arduino UNO.
CO-4	Develop Raspberry Pi interfacing programs using python concepts
CO-5	Apply Raspberry Pi and arduino uno programming for IoT bases projects
Course-96	
Course Code:	A1581
Course Title:	BASIC DATA STRUCTURES
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the time and space complexities of algorithm
CO-2	Apply various operations on linear data structures
CO-3	Design searching and sorting techniques for a given application
CO-4	Develop nonlinear programming for optimization techniques
Course-97	
Course Code:	A1583

Course Title:	BASICS OF SOFTWARE ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the phases of software development life cycle in application development
CO-2	Identify software requirements for construction
CO-3	Design requirement engineering process for change management
CO-4	Apply the design concepts for design models
CO-5	Construct the various testing techniques for software systems
Course-98	
Course Code:	A1584
Course Title:	PYTHON FOR EVERYONE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the basic constructs of Python to solve problems
CO-2	Organize lists, tuples and dictionaries appropriately to solve complex problems
CO-3	Build functions to increase code reusability
CO-4	Implement modular programming for organized software development
CO-5	Make use of exception handling for robust programming.
Course-99	
Course Code:	A1585
Course Title:	COMPUTER ORGANIZATION AND OPERATING SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the fundamentals of computer organization in designing a system
CO-2	Apply the concepts of programming language to solve system problems
CO-3	Make use of the operating systems design structure and its services for system programming
CO-4	Develop process scheduling algorithms and inter-process communication systems for resource management
CO-5	Classify memory management techniques and virtual memory mechanisms for apt implementation
Course-100	
Course	A1582

Code:	
Course Title:	FUNDAMENTAL OF DBMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply suitable data models for given application
CO-2	Design database using integrity constraints and ACID properties
CO-3	Construct optimized SQL queries to solve real time problems
CO-4	Apply suitable normal form to eliminate data redundancy
CO-5	Choose appropriate index structure to improve performance
Course-101	
Course Code:	A1586
Course Title:	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze different fields in which AI is applied
CO-2	Apply suitable search strategies in finding better solution for a given problem
CO-3	Identify linear regression with single and multiple variables
CO-4	Perform predictive analysis using decision trees and random forest classifier
CO-5	Implement deep learning neural network models with Tensor Flow
Course-102	
Course Code:	A1081
Course Title:	MANAGEMENT SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the concepts, theories, and principles of management in professional life
CO-2	Design suitable organization structure for managing the operations in the organization.
CO-3	Apply principles of management to the various functional areas of an organization such as human resource, marketing and production.
CO-4	Evaluate cost and time of each business project by using PERT and CPM techniques.
CO-5	Formulate the new strategies that enhance competitive edge

Course-103	
Course Code:	A1082
Course Title:	RESEARCH METHODOLOGY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Interpret the importance of literature survey to identify the research problem.
CO-2	Develop suitable research methodologies to conduct engineering research.
CO-3	Apply the principles of research to gather the required data from various sources.
CO-4	Evaluate the gathered data by using appropriate statistical techniques.
CO-5	Prepare and present the research report effectively with the help of visual aids.
Course-104	
Course Code:	A1083
Course Title:	INTELLECTUAL PROPERTY RIGHTS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze ethical and professional issues which arise in the intellectual property law context.
CO-2	Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.
CO-3	Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.
CO-4	Make use of copyrighted material so that it does not obstruct the progress of human knowledge
CO-5	Analyze IPR policies before filing patentable inventions and discoveries.
Course-105	
Course Code:	A1084
Course Title:	NATIONAL SERVICE SCHEME
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Classify the organizational structure of NSS and its activities
CO-2	Identify the methods of mobilization and importance of youth Leadership
CO-3	Develop a sense of social and civic responsibility and provide solutions to individual and community problems

CO-4	Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions
CO-5	Develop capacity to meet emergencies and natural disasters
Course-106	
Course Code:	A1085
Course Title:	YOGA
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Improve physical conditioning related to flexibility through participation in yoga.
CO-2	Develop and maintain a personal yoga practice.
CO-3	Recognize and apply the value and benefits of an on-going yoga practice
CO-4	Select asana appropriate for personal needs
CO-5	Identify and apply relaxation techniques for stress reduction
Course-107	
Course Code:	A1086
Course Title:	DESIGN THINKING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Appreciate various design processes for creativity and innovation
CO-2	Develop design ideas through different techniques
CO-3	Identify the significance of reverse engineering about products
CO-4	Make use of design drawings to communicate ideas effectively
CO-5	Build organizations that support creative and innovative thinking
PROGRAMOUTCOMES (R18Regulation)	
Program Outcomes	
PO-1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem analysis: Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3	Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO-4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO-5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO-6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO-7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.
PO-8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO-9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO-10	Communications: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give receive clear instructions.
PO-11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO-12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest īcontext of technological change.
PROGRAM SPECIFIC OUTCOMES (R18 Regulation)	
Program Specific Outcomes	
PSO-1	Design, Develop, Test and maintain software systems for business applications.
PSO-2	Evaluate and tune software systems for better performance.

DEPARTMENT OF CSE-INTERNET OF THINGS ENGINEERING	
COURSE OUTCOMES (R20- Regulation)	
Course-1	
Course Code:	A30019
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO-2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
CO-3	Classify the market structure to decide the fixation of suitable price
CO-4	Apply capital budgeting techniques to select best investment opportunity.
CO-5	Analyze and prepare financial statements to assess financial health of business.
Course-2	
Course Code:	A30507
Course Title:	DATABASE MANAGEMENT SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply suitable data model for given application
CO-2	Construct optimized SQL queries to solve real time problems
CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Use suitable transaction model to avoid Deadloc
CO-5	Choose appropriate index structure to improve performance
Course-3	
Course Code:	A30016
Course Title:	DISCRETE MATHEMATICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the logic statements and connectives to solve real time problems
CO-2	Classify algebraic structure and relations for a given mathematical problem
CO-3	Analyze the basic results in combinatorics and binomial thermos for accuracy
CO-4	Apply various recurrence relations to find solutions for numeric sequences
CO-5	Apply graph theory techniques to solve network problems
Course-4	
Course Code:	A30016
Course Title:	DISCRETE MATHEMATICS

Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the logic statements and connectives to solve real time problems
CO-2	Classify algebraic structure and relations for a given mathematical problem
CO-3	Analyze the basic results in combinatorics and binomial thermos for accuracy
CO-4	Apply various recurrence relations to find solutions for numeric sequences
CO-5	Apply graph theory techniques to solve network problems
Course-5	
Course Code:	A33503
Course Title:	COMPUTER NETWORKS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the networking concepts in configuring the systems.
CO-2	Illustrates error handling mechanism in data link layer.
CO-3	Analyze the routing algorithms in finding the shortest path.
CO-4	Apply transport protocols in network communications.
CO-5	Implements domain name service and network security in the communication segment.
Course-6	
Course Code:	A30512
Course Title:	DESIGN AND ANALYSIS OF ALGORITHMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the efficiency of algorithm for a given problem.
CO-2	Formulate the time order analysis for given algorithm.
CO-3	Identify the mathematical techniques required to prove the time complexity of an algorithm
CO-4	Design appropriate algorithm to solve real world problems.
CO-5	Develop an application with the designed algorithms.
Course-7	
Course Code:	A30509
Course Title:	DATABASE MANAGEMENT SYSTEMS LABORATORY

Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design Database tables for the given problem
CO-2	Use appropriate querying processing technique to access the data
CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Develop PL/SQL routines for reusability of code
CO-5	Apply appropriate triggering concepts for automation and performance

Course-8	
Course Code:	A33504
Course Title:	COMPUTER NETWORKS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply the network principles in establishing network communications
CO-2	Make use of layered network architecture functionalities in connecting systems
CO-3	Apply mathematical concepts in solving the computational problems
CO-4	Analyze performance of protocols in information exchange
CO-5	Compare routing algorithms for dynamic routing

Course-9	
Course Code:	A30516
Course Title:	DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply basic programming techniques in solving given problem.
CO-2	Design an algorithm for a given application program
CO-3	Utilize wrapper classes as per the demand of problem.
CO-4	Apply the appropriate algorithmic technique for efficient problem solving.
CO-5	Execute collection classes for dynamic programming.

Course-10	
Course Code:	A30510
Course Title:	ANDROID APPLICATION DEVELOPMENT
Theory/ Laboratory:	Laboratory
Course Outcomes	

CO-1	Understand the different types of mobile devices.
CO-2	Learn how to apply Android Operating System on mobile.
CO-3	They can understand the systems mobile application distribution.
C0-4	Implementation of mobile design principles.
C0-5	Implementation of prompt prototyping techniques to design and develop mobile interfaces
Course-11	
Course Code:	A30032
Course Title:	UNIVERSAL HUMAN VALUES
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
C0-2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
C0-3	Understand the value of harmonious relationship based on trust and respect in their life and profession
C0-4	Understand the role of a human being in ensuring harmony in society and nature.
C0-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work
C0-6	Analyze the value of maintaining ethical values in critical situations
R20 REGULATIONS	
Course-1	
Course Code:	A33509
Course Title:	IoT SYSTEM DEVELOPMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply Design Methodology concepts for developing IoT applications
C0-2	Interface I/O devices, Sensors with ESP32 using MicroPython.
C0-3	Connect the I/O devices, Sensors with IoT Servers using ESP32 and Raspberry Pi.
C0-4	Apply Python GUI concepts for programming of Raspberry Pi
C0-5	Develop IoT applications using ESP32 and Raspberry Pi.
Course-2	
Course Code:	A33510
Course Title:	JAVA PROGRAMMING

Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Comprehend Java Virtual Machine architecture and Java Programming Fundamentals
C0-2	Design applications involving Object Oriented Programming concepts such as inheritance, association, aggregation, composition, polymorphism, abstract classes and interfaces..
CO-3	Design and build multi-threaded Java Applications.
CO-4	Build software using concepts such as files, collection frameworks and containers.
CO-5	Design and implement Java Applications for real world problems involving Database Connectivity.
Course-3	
Course Code:	A33511
Course Title:	Wireless Sensor Networks
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Explain the basic principles of Wireless Sensor Networks
CO-2	Critically analyze transport protocols of WSNs
CO-3	Explore the routing strategies of WSNs
CO-4	Use operating systems related to WSN
Course-4	
Course Code:	A33512
Course Title:	IoT SYSTEM DEVELOPMENT LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Develop MicroPython Programs using ESP32 and Mu Editor.
CO-2	Execute MicroPython programs for blink led, push button, potentiometer, serial interface, lcd, dht sensor.
CO-3	Build Programs of Raspberry Pi using python GUI tkinter and streamlit
CO-4	Interface led, rgb led, ir sensor and dht11 with Raspberry Pi using python GUI
CO-5	Test and Debug ESP32 MicroPython and Raspberry Pi python GUI programs.
Course-5	
Course Code:	A33513
Course Title:	Java Programming Lab

Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Design solutions for the problems of general purpose applications using object oriented concepts
C0-2	Generate reusable codes using inheritance, user defined packages and interface
C0-3	Write robust and efficient code using exception handling and multi-threading concepts.
C0-4	Implement collection frameworks and file handling techniques to store and retrieve data.
C0-5	Design user interface using swings.
Course-6	
Course Code:	A33114
Course Title:	Web Application Development
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Programming skills in Html5, CSS3, and Bootstrap 4.
C0-2	Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+)
C0-3	Web application Development Database with React and React Native..
Course-7	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Develop a better understanding of important issues related to gender in contemporary India.
C0-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender.
C0-3	Acquire insight into the gendered division of labour and its relation to politics and economics
C0-4	Equip to work and live together as equals.
C0-5	Develop a sense of appreciation of women in all walks of life.
Course-8	
Course Code:	A33515
Course Title:	IoT Application Development on Cloud Platforms
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Perform Data Acquisition and analysis using Cloud and Tkinter.

C0-2	Understand the vision of IoT from a global context.
C0-3	Determine the Market perspective of IoT.
C0-4	Use of Devices, Gateways and Data Management in IoT
C0-5	Building state of the art architecture in IoT.
Course-9	
Course Code:	A33516
Course Title:	Mobile Application Development for IOT
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Emulate the Android Apps on Emulator and Handset.
C0-2	Design User Interfaces for Mobiles using Android Studio.
C0-3	Apply Bluetooth APIs for developing Bluetooth Apps.
C0-4	Monitor and Control I/O devices via Bluetooth using Smart Phone and Arduino
CO-5	Create Mobile Apps for IoT using Firebase cloud.
Course-10	
Course Code:	A33517
Course Title:	Data Visualization Techniques
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Effectively present the data
C0-2	Draw insights from the data
C0-3	Use Tableau
Course-11	
Course Code:	A33518
Course Title:	IoT Application Development on Cloud Platforms Lab
Theory/ Laboratory:	Theory
Course Outcomes	

C0-1	Create Cloud platform account and widget creation.
C0-2	Connect the Cloud widgets with IoT things.
C0-3	Design dashboards on cloud platforms.
C0-4	Link the Alexa with Arduino IoT Cloud.
C0-5	Develop Cloud platform based IoT Applications.
Course-12	
Course Code:	A33522
Course Title:	Mobile Application Development for IOT Lab
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Design User Interfaces using android studio
C0-2	Execute the Android Apps on Emulator and Mobiles.
C0-3	Test and Debug the Android Programs
C0-4	Monitor and Control I/O devices via Bluetooth using Smart Phone and Arduino.
C0-5	Create Mobile Apps for IoT using Firebase cloud
Course-13	
Course Code:	A33520
Course Title:	Data Visualization Techniques Lab
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Understand and describe the main concepts of data visualization
C0-2	Publish the created visualizations to Tableau Server and Tableau Public
C0-3	How to recognize good (and bad) data visualizations, how to interpret a data visualization, and Using shapes, colors, text and layout appropriately
C0-4	Identifying stories and insights in data, preparing data for visualization, and create several different charts using Tableau.
Course-14	
Course Code:	A30021
Course Title:	Professional English Communication Skills

Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Use techniques at different levels to convince the employers.
C0-2	Use technology to convince the audience with skills.
C0-3	Realize where exactly he has to improve.
C0-4	Communicate effectively using the ICT tools.
C0-5	Learn and be competent in heterogeneous groups.
Course-15	
Course Code:	A30036
Course Title:	Indian Constitution and Multiculturalism
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Differentiate between structure and functions of state secretariat
C0-2	Understand historical background of the constitution making and its importance for building a democratic India.
C0-3	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
C0-4	Understand the value of the fundamental rights and duties for becoming good citizen of India.
C0-5	Analyze the decentralization of power between central, state and local self-government.

Program Educational Objectives
PEO 1: Apply Mechanical Engineering concepts by analyzing and solving the real time problems arising in mechanical systems of industry.
PEO 2: Develop leadership and communication skills and participate in continuous learning activities to advance their careers and life goals.
PEO 3: To enable to become a responsible citizen who undertakes the activities related to society for academic development nationally and internationally**.**
PEO 4: Adapt to rapidly changing industry needs by acquiring require technical knowledge that promotes innovation
Program Outcomes (PO'S) :
Engineering graduates will be able to

PO 1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems
PO 2: Problem analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
PO 3: Design/development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO 5: Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development
PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
PO 9: Individual and team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings
PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO 11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 12: Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
Programme Specific Outcomes:
PSO 1: Design, Develop, Test and maintain software systems for business applications.
PSO 2: Evaluate and tune software systems for better performance.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING- ARTIFICIAL INTELLIGENCE (CAI)	
Course Title:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO-2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
CO-3	Classify the market structure to decide the fixation of suitable price
CO-4	Classify the market structure to decide the fixation of suitable price
CO-5	Apply capital budgeting techniques to select best investment opportunity
CO-6	Analyze and prepare financial statements to assess financial health of business.
Course-19	
Course Code:	A30507
Course Title:	DATABASE MANAGEMENT SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Apply suitable data model for given application
CO-2	Construct optimized SQL queries to solve real time problems
CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Use suitable transaction model to avoid Deadlock
CO-5	Choose appropriate index structure to improve performance
Course-20	
Course Code:	A30516
Course Title:	DESIGN AND ANALYSIS OF ALGORITHMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	|Analyze the efficiency of algorithm for a given problem.
CO-2	Formulate the time order analysis for given algorithm.
CO-3	Formulate the time order analysis for given algorithm.
CO-4	Design appropriate algorithm to solve real world problems.
CO-5	Develop an application with the designed algorithms.

Course-21	
Course Code:	A30421
Course Title:	DIGITAL ELECTRONICS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.
CO-2	Make use of k-map and tabulation methods to minimize Boolean functions and to implement with logic gates.
CO-3	Analyse basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters
CO-4	Distinguish combinational and sequential logic in terms of their functions
CO-5	Design various PLDs such as ROMs, PALs, PLAs and PROMs.

Course-22	
Course Code:	A30018
Course Title:	NUMERICAL METHODS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply numerical methods to solve algebraic and transcendental equations.
CO-2	Derive interpolating polynomials using interpolation formulae
CO-3	Apply curve fitting techniques for data representations and computation in engineering Analysis
CO-4	Apply Ordinary Differential Equations to solve Engineering Problems
CO-5	Solve differential and integral equations numerically.

Course-23	
Course Code:	A30509
Course Title:	DATABASE MANAGEMENT SYSTEMS LABORATORY
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Design Database tables for the given problem
CO-2	Use appropriate querying processing technique to access the data

CO-3	Apply suitable normal form to eliminate data redundancy
CO-4	Develop PL/SQL routines for reusability of code
CO-5	Apply appropriate triggering concepts for automation and performance
Course-24	
Course Code:	A30422
Course Title:	DDIGITAL ELECTRONICS LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Design digital logic circuits using software.
CO-2	Verify the logical operations of the digital logic gates in the laboratory.
CO-3	Analyze the functionality of Combinational and Sequential Circuits using LogiSIM.
CO-4	Design and analyze the code converters using LogiSIM.
CO-5	Design and analyze the counters using LogiSIM.

Course-25	
Course Code:	A30516
Course Title:	DESIGN AND ANALYSIS OF ALGORITHMS
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Apply basic programming techniques in solving given problem.
CO-2	Design an algorithm for a given application program
CO-3	Utilize wrapper classes as per the demand of problem
CO-4	Apply the appropriate algorithmic technique for efficient problem solving.
CO-5	Execute collection classes for dynamic programming.

Course-26	
Course Code:	A30510
Course Title:	ANDROID APPLICATION DEVELOPMENT
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the different types of mobile devices.
CO-2	Learn how to apply Android Operating System on mobile.
CO-3	They can understand the systems mobile application distribution.
CO-4	Implementation of mobile design principles.

CO-5	Implementation of prompt prototyping techniques to design and develop mobile interface
Course-27	
Course Code:	A30031
Course Title:	ENVIRONMENTAL SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Solve environmental problems through higher level of personal involvement and interest.
CO-2	Apply ecological morals to keep up amicable connection among nature and human beings
C0-4	Recognize the interconnectedness of human dependence on the earth's ecosystems
C0-5	Apply environmental laws for the protection of environment and wildlifev
C0-6	Influence society in proper utilization of goods and services.
Course-28	
Course Code:	A33106
Course Title:	DATA SCIENCE
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Understand the fundamental concepts of data science
C0-2	Evaluate the data analysis techniques for applications handling large data
C0-3	Demonstrate the various machine learning algorithms used in data science process
C0-4	Understand the ethical practices of data science
C0-5	Visualize and present the inference using various tools
Course-29	
Course Code:	A30506
Course Title:	OBJECT ORIENTED PROGRAMMING USING JAVA
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply object oriented concepts for solving general purpose problems
C0-2	Use inheritance, user defined packages and interfaces for code reusability
C0-3	Apply exception handling and multithreading for robust and efficient application development

C0-4	Implement collection frameworks to store and retrieve data efficiently
C0-5	Build GUI applications using swings for user interface design
Course-30	
Course Code:	A30016
Course Title:	DISCRETE MATHEMATICS
Theory/ Laboratory:	Theory
Course Outcomes	
C0-1	Apply the logic statements and connectives to solve real time problems
C0-2	Classify algebraic structure and relations for a given mathematical problem
CO-3	Analyze the basic results in combinatorics and binomial thermos for accuracy
CO-4	Apply various recurrence relations to find solutions for numeric sequencev
CO-5	Apply graph theory techniques to solve network problems
Course-31	
Course Code:	A30513
Course Title:	OPERATING SYSTEMS
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Apply the basic principles of Operating Systems in system programming
CO-2	Apply the process synchronization concepts in multiprogramming environment
CO-3	Solve the memory management problems with paging and segmentation techniques
CO-4	Design algorithmic strategies to handle deadlock problems
CO-5	Implement the concepts of secured file system for confidentiality and authentication
Course-32	
Course Code:	A30514
Course Title:	SOFTWARE ENGINEERING
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the various phases of software development life cycles and software Requirements.
CO-2	Possess necessary skills to elicit the requirements of a software system and to create well written software documentation involving appropriate system

	models
CO-3	Design, implement and evaluate a computer based system, process, component or program to meet desired needs within realistic constraints specific to the field
CO-4	Construct software projects by integrating components with appropriate user interface
CO-5	Apply various testing strategies to verify, validate and to release error free software
Course-33	
Course Code:	A33107
Course Title:	DATA SCIENCE LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Apply Abstraction to create models based on the real world.
C0-2	Understand several techniques from previously established paradigms, including modularity, encapsulation and Polymorphism.
C0-3	Apply greater flexibility and maintainability in programming.
C0-4	Improve the knowledge on Objects and class.
Course-34	
Course Code:	AMEB54
Course Title:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY
Theory/ Laboratory:	Laboratory
Course Outcomes	
C0-1	Design solutions for the problems of general purpose applications using object oriented concepts.
C0-2	Design solutions for the problems of general purpose applications using object oriented concepts.
C0-3	Write robust and efficient code using exception handling and multithreading concepts
C0-4	Implement collection frameworks and file handling techniques to store and retrieve data
C0-5	Design user interface using swings
Course-35	
Course Code:	AMEB55
Course Title:	OPERATING SYSTEMS LABORATORY

Theory/ Laboratory:	LABORATORY
Course Outcomes	
C0-1	Apply appropriate CPU scheduling algorithm for the given problem.
C0-2	Perform resource management for optimal utility of CPU.
C0-3	Implement algorithms handling deadlock problems
C0-4	Implement the concepts of secured file system for confidentiality and authentication.
C0-5	Apply threading concepts to handle concurrency.
Course-36	
Course Code:	AHSB15
Course Title:	UNIX & SHELL PROGRAMMING
Theory/ Laboratory:	THEORY
Course Outcomes	
C0-1	Understand the basic unix/linux commands
C0-2	Learn importance of shell scripting
C0-3	Apply shell programming to various files
C0-4	Improve individual / teamwork skills, communication & report writing skills with ethical values
	R20 REGULATIONS
Course-1	
Course Code:	A33109
Course Title:	Artificial Intelligence
Theory/ Laboratory:	Theory
Course Outcomes:	
CO-1	Evaluate Artificial Intelligence (AI) methods and describe their foundations.
CO-2	Apply basic principles of AI in solutions that require problem solving, inference, perception.
CO-3	Analyze and illustrate how search algorithms play vital role in problem-solving
CO-4	Demonstrate knowledge of Agents and learning in online search.

CO-5	Illustrate the construction of learning and expert system.
Course-2	
Course Code:	A33110
Course Title:	Theory of Computation and Compiler Design
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Compare and analyze different computational models.
CO-2	Apply regular expressions to computer languages.
CO-3	Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
CO-4	Design parsers using top-down as well as bottom-up paradigms
CO-5	Understanding the intermediate code generation.
Course-3	
Course Code:	A33111
Course Title:	Machine Learning
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Identify machine learning techniques suitable for a given problem.
CO-2	Solve the problems using various machine learning techniques.
CO-3	Design application using machine learning techniques.
CO-4	Able to apply Regression methods for a given problem.
CO-5	Design of clustering techniques for a given problem.

Course-4	
Course Code:	A33112
Course Title:	Artificial Intelligence Lab
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Implement search algorithms
CO-2	Solve Artificial intelligence problems
CO-3	Design chatbot and virtual assistant
Course-5	
Course Code:	A33113
Course Title:	Machine Learning Lab
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Understand the Mathematical and statistical prospectives of machine learning algorithms through python programming
CO-2	Appreciate the importance of visualization in the data analytics solution.
CO-3	Derive insights using Machine learning algorithms
Course-6	
Course Code:	A33114
Course Title:	Web Application Development
Theory/ Laboratory:	Theory
Course Outcomes	

CO-1	Programming skills in Html5, CSS3, Bootstrap 4.
CO-2	Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+)
CO-3	Web application Development Database with React and React Native.
Course-7	
Course Code:	A30034
Course Title:	GENDER SENSITIZATION
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Develop a better understanding of important issues related to gender in contemporary India
CO-2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender
CO-3	Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4	Equip to work and live together as equals
CO-5	Develop a sense of appreciation of women in all walks of life
Course-8	
Course Code:	A33116
Course Title:	Deep Learning
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Demonstrate the mathematical foundation of neural network
CO-2	Understand the architecture of a deep neural network
CO-3	Build a Convolutional neural network

CO-4	Build and train RNN and LSTMs
Course-9	
Course Code:	A33117
Course Title:	Cryptography and Network Security
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand basic cryptographic algorithms, message and web authentication and security issues.
CO-2	Identify information system requirements for both of them such as client and server.
CO-3	Understand the current legal issues towards information security.
Course-10	
Course Code:	A33118
Course Title:	Natural Language Processing
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Understand the logic behind Natural languages
CO-2	Understand the significance of syntax and semantics of natural languages
CO-3	Process the Natural languages
CO-4	Verify the syntax and semantics of languages
CO-5	Design new natural languages
Course-11	
Course Code:	A33119
Course Title:	Deep Learning Lab

Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify the Deep learning algorithms which are more appropriate for various types of learning tasks in various domains
CO-2	Implementing Deep learning algorithms and solve real-world problems.
Course-12	
Course Code:	A33122
Course Title:	Cryptography and network security Lab
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Identify basic security attacks and services
CO-2	Use symmetric and asymmetric key algorithms for cryptography
CO-3	Make use of Authentication functions
Course-13	
Course Code:	A33121
Course Title:	Natural Language Processing Lab
Theory/ Laboratory:	Laboratory
Course Outcomes	
CO-1	Understand approaches to syntax and semantics in NLP.
CO-2	Analyse grammar formalism and context free grammars
CO-3	Apply the statistical estimation and statistical alignment models
CO-4	Apply Rule based Techniques, Statistical Machine translation (SMT), word alignment, phrase-based translation

CO-5	Have the skills (experience) of solving specific NLP tasks, which may involve programming in Python, as well as running experiments on textual data.
Course-14	
Course Code:	A30016
Course Title:	Professional English Communication Skills
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Use techniques at different levels to convince the employers.
CO-2	Use technology to convince the audience with skills.
CO-3	Realize where exactly he has to improve.
CO-4	Communicate effectively using the ICT tools.
CO-5	Learn and be competent in heterogeneous groups.
Course-15	
Course Code:	A30033
Course Title:	Indian Constitution and multiculturalism
Theory/ Laboratory:	Theory
Course Outcomes	
CO-1	Differentiate between structure and functions of state secretariat
CO-2	Understand historical background of the constitution making and its importance for building a democratic India.
CO-3	Understand the functioning of three wings of the government ie.executive, legislative and judiciary
CO-4	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-5	Analyze the decentralization of power between central, state and local selfgovernment.

CO-6	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

Course-6

- **PEO 1:** Apply principles of Computer science and engineering with analytical thinking and problem solving skills for developing software systems.

- **PEO 2:** Adapt to rapidly changing industry needs by acquiring required technical skills .

PEO-3: Assess real time problems and develop suitable technological solutions to full fill the needs of society.

- **PEO 4:** Develop leadership skills and engage in life-long learning to meet the changing global needs.

Program Outcomes (PO's):

Engineering Graduates will be able to

PO 1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization to the solution of complex engineering problems

- **PO 2.** Problem analysis: Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

- **PO 3**. Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.

- **PO 4.** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- **PO 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

- **PO 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- **PO 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of and need for sustainable development.

- **PO 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- **PO 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **PO 10. Communications:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give receive clear instructions.

• **PO 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
• **PO 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest īcontext of technological change.
• **Program Specific Outcomes (PSO's):**
• **PSO 1:** Design, Develop, Test and maintain software systems for business applications.
• **PSO 2:** Evaluate and tune software systems for better performance.

Principal

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